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DISTANCE LEARNING CASE STUDIES

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INTRODUCTION
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Introduction

The 1980's have witnessed keen interest in alternative instructional delivery systems for American public education. Distance learning projects utilizing telecommunications technologies such as satellites, cable television, fiber optics, microwave, slow scan TV, instructional television fixed services, and microcomputer networking have opened up opportunities for school districts to coordinate schedules and to share resources. The result has been an expansion of curricular offerings and educational opportunities for students.

Fueled by state sponsored curriculum reform intended to improve quality in American education and equity in its distribution, the concept of distance education has caught the attention of many national and state education officials. In geographically remote and isolated schools where a certified teacher is not always available or in small schools where limited student enrollments makes hiring teachers for low incident courses cost prohibitive, instruction via some form of telecommunicated distance learning may be "the next best thing to being there." In large urban or metropolitan schools faced with teacher shortages, telecommunicated delivery would enable a teacher in one school to teach her class in the traditional manner while at the same time be connected to students across town for whom a qualified teacher in the subject area is unavailable.

Rationale for Case Study Descriptions on Distance Education Technologies

In a 1987-88 survey of the States conducted as a part of the assessment Power On! New Tools for Teaching and Learning, the Office of Technology Assessment (OTA) in Washington, DC identified 35 states that either had in place or were planning projects at the K-12 level using technology for distance delivery of educational curricula. These projects vary in scope, cost, objectives, technologies employed, and level of services provided. Yet they each share a common interest in using technology (audio, video, telecommunications, and microcomputer) to provide education resources for students and teachers. This growing interest in distance learning presents new opportunities and new challenges to local, state, and Federal policy makers. Many projects cross traditional local and state boundaries, involve public and private institutions, and link elementary and secondary schools with colleges and university.

There is a definite need to understand how present and future efforts might or should proceed in this emerging field of telecommunicated distance education delivery.

Accordingly, in January 1989, the Office of Technology Assessment authorized, as a part of a national report on distance education, a series of case studies to investigate how technologies, services, and programs are implemented in distance learning projects. The studies were also intended to look at the role of local, state, and Federal agencies, and other public and private entities in providing educational services to students, and training and staff development for teachers.

Selection and Brief Description of Case Studies Sites

Seven case studies of ongoing distance education projects were selected for study. These represent a range in terms of size, differing applications of technology, and are geographically spread across the United States. Two case studies are of large interactive satellite TV systems, one is a microwave TV network in a large urban setting, two systems employ audiographics microcomputer networking, one is a two-way TV cooperative using fiber optics, and one is a combination of microwave TV combined with UHF TV and audiographics. The projects studied are based in Texas, Oklahoma, Washington, North Carolina, New York, Pennsylvania, and Utah.

Satellite Telecommunicated Educational Program (STEP)

The STEP satellite network is a service of Education Service District 101 in Spokane, Washington. STEP is a national satellite network that presents one-way TV, two-way audio delivery of educational programs to over 80 subscribing schools in seven different states. The network has been operative since 1986. The project was selected because of its national focus and the fact that a public agency (ESD 101) has joined with a private company (RXL Communications) to produce and deliver educational programming.

Region 8 - Western Carolina Educational Center

In January of 1988, the North Carolina Department of Public Instruction contracted with the TI-IN Network of San Antonio, Texas to install 153 satellite downlinks in North Carolina. Within the service area of the Western Carolina Educational Center, 11 small rural schools received satellite dishes to pick up TI-IN programming. The project was selected because of its regional use of TI-IN, the nation's largest satellite vendor for K-12 programming. Also, TI-IN is a private, for-profit vendor of educational programming.

InterAct Instructional Television Network

The InterAct instructional Television Network is a 50 watt instructional television fixed services (ITFS) network operated by the Region IV Education Service Center in Houston, Texas. It delivers one-way TV, two-way audio instruction to subscribing schools in the Houston metropolitan and Texas Gulf Coast areas. The system was chosen because of its delivery of course work to a predominately urban rather than rural constituency. Also because of its use of Federally licensed FCC ITFS channels as the delivery medium.

The Delaware-Chenango BOCES Audiographics Network

The Delaware-Chenango BOCES is a pioneer audiographics teleteaching site in New York State which has linked microcomputers together for teleteaching since 1985. The BOCES manages a small network of 10 schools which are members of the teleteaching project. This project was chosen because of its regional focus, and the reported low costs of employing an audiographics network.

The Pennsylvania Teleteaching Project

The Pennsylvania Teleteaching Project is the largest statewide audiographics program in the nation. In 1989, 48 sites were linked in partnerships of two or three schools working together to share courses. The project was chosen because of the Pennsylvania Department of Education's support for the program and because of its statewide focus. This case study also highlights the partnership arrangement of one school district to share educational programming with a juvenile detention center in its area and to deliver Chapter

I reading to a private elementary school.

The Panhandle Share-ED Video Network

The Panhandle Share-ED Video Network is a linkage of four rural school districts in the Panhandle of Oklahoma which obtained grant monies to lay fiber optics between the four schools to connect TV cameras to form a two-way, full-motion video network. The system was initiated by local superintendents and officials at Panhandle Telephone Cooperative Incorporated. The project formally began offering TV courses in the fall of 1988. It was chosen for study because of its use of fiber optics, its small size, and the fact that the entire project was conceived, planned, and initiated locally.

The Northeastern Utah Telelearning Project

The North Eastern Utah Telelearning Project began in 1985 and is a cooperative effort of the Northeastern Utah Educational Service Center, seven local districts, and the region's Area Vocational Center. Technology used in the system includes microcomputers, telephones, dedicated phone lines, simplex and duplex microwave TV and UHF TV The system was selected for study because of its multiple, yet compatible use of a variety of distance learning media.

Research Design of Case Studies

Data gathering methods included extensive review of written documents provided by key project directors or available in the professional literature, telephone interviews, and on-site visit and observations of actual distance learning classes associated with each project. In addition, survey questionnaires were designed and data collected from (1) school administrators (superintendents and building principals), (2) students studying via the technology, (3) traditional teachers in the school who were aware of the distance education program in their building, and (4) distance education teachers who are teaching via the technology. Results from survey data is reported in each of the case studies.

Research Topics

The contract, awarded by OTA via competitive bid, called for the case studies to examine a variety of distance learning efforts in K-12 education. The studies were to cover diverse projects in different settings. The studies were to focus on:

- Educational context and community served
- Technology utilized
- Organization and financial structure
- The role of teachers
- Costs and evaluation
- Future development
- Roles and relationships of participating entities

Among specific research questions asked, were:

1. What specific hardware/software requirements are

needed for each technology? What are the up-front costs, yearly maintenance costs, life expectancy of equipment, etc?

2. What programming is provided -- elementary, secondary, enrichment, adult education, college credit, teacher inservice, etc.? What is the cooperative arrangement between schools for class scheduling, selection of "distance education" teachers, sharing of operational costs, issuance of credit, evaluation of teachers, policy for student absenteeism and make-up work, policy for maximum/minimum class size, etc.? How are classroom facilitators used, what are the qualifications of classroom facilitators, is training provided and, if so, to what extent?

3. How do school administrators feel regarding effectiveness of instruction taught via the technology? Do other teachers in the school/district feel their jobs are threatened by distance education teachers? Do other teachers feel distance education teachers are teaching effectively and how do the distance education students feel about this approach to learning. What previous research has been conducted at each of the projects selected for study?

4. How are tests administered, handouts distributed, and homework assignments routed between students and their distance education teacher. What is the frequency of broadcasts -- daily, twice per week, weekly?

5. How often do the distance teacher and the students actually interact with each other and what are the nature of these interactions. Do parents and school administrators have access to the distance teacher and to what extent? Does the technology allow students at one site to interact with students at other sites or are the interactions limited only between the teacher and the students?

6. What is the interest level of students studying via a distance education medium? How is student discipline, participation, time-on-task, cooperation, etc. maintained at the "remote" sites.

7. What strengths/weaknesses in a particular distance learning system are seen by administrators, teachers,

and students.

Project Completion

Funding to conduct the case studies was awarded by OTA in January 1989. Initial telephone interviews were conducted between January and March. Printed materials were collected and reviewed between January and June. Site visits were made to each project between January and March. Survey data for each project was collected between February and April. Initial drafts of each case study were submitted to OTA in mid April. Drafts were reviewed by key project personnel for each study and by independent reviewers identified by OTA. Additional telephone interviews were conducted in May and June to make necessary revisions as requested by OTA and project personnel at the case study sites. Revisions were completed in May and early June. The final drafts were submitted to OTA in June 1989.

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May 1989

SATELLITE TELECOMMUNICATIONS EDUCATIONAL PROGRAMMING: A MULTI-STATE COOPERATIVE OF SCHOOL DISTRICTS RECEIVING SATELLITE DELIVERED TV INSTRUCTION

Background Information

The Satellite Telecommunications Educational Programming (STEP) network is an interactive TV instructional delivery system that telecasts live instruction via satellite uplink from broadcast studios contracted by Education Service District 101 in Spokane, Washington to downlink dishes at subscribing school districts in an eight state area. Broadcast signals, both video and audio, are carried from the classroom studios by means of satellite technology to receive site locations. Audio talk-back from the students is over standard telephone lines.

Televised high school credit courses, broadcast over satellite, made their debut in 1985 when Texas' TI-IN Network and Oklahoma State University's Arts and Science Teleconferencing Service independently began uplinking instruction to a handful of high schools in Texas, Oklahoma, California, Arkansas and other states. The following year, Educational Service District 101 in Spokane joined the high school satellite TV pioneers by initiating STEP. In 1986, STEP offered five high school courses to 13 school districts in Washington state. This increased to 41 the second year. The network has since grown to over 80 downlink sites in eight states, and is now one of the largest K-12 distance learning programs in the United States.

Education Service District 101 is one of nine education service units in Washington. Like their counterparts in other states, the concept of the education service districts in Washington is to act as a liaison between local school districts and the Office of the State Superintendent of Public Instruction. ESDs also conduct programs in response to the needs of local districts and assist in equalizing educational opportunities for students. ESD 101 is organized into fiscal, insurance, program, and instructional divisions to serve a seven county area that includes 59 public school districts and 55 state approved private schools.

The STEP network is organized under ESD 101's instructional division. In addition to delivering TV courses by satellite, the instructional division provides area schools with instructional media materials (16 mm films, video cassettes, etc.), microcomputer and typewriter maintenance, driver training education. Because of its satellite uplink capabilities, ESD 101 has received permission from the state legislature to deliver its TV courses beyond its customary service area to the entire state. Permission to deliver courses outside Washington has also been granted, provided no costs are incurred by the state.

Educational Context and Community Served

The STEP program is in its third full year of operation. The network has the capability of broadcasting throughout North America and Hawaii. Presently, some 80 school districts in eight states have contracted with ESD 101 to receive satellite instruction: Washington, Oregon, Idaho, Montana, California, Alaska, Kansas, and Missouri. Washington accounts for the largest number of school districts participating, followed by Oregon, Alaska, Montana and Idaho. California, Missouri, and Kansas each have one site. Most districts that belong to the network are small and rural. A few very large districts, however, also belong to STEP. Their involvement, to date, has been to receive staff development and student enrichment programming -- not high school credit courses. For example, Seattle School District, with over 4500 faculty and staff, joined strictly for staff development purposes. Another large user is Oregon State College (OSC) in Legrande. OSC receives the Japanese language class for use in certifying the college's education students to teach Japanese language. In early 1989, over 60 OSC students were enrolled in STEP's Japanese language class.

The course is offered as a high school and/or college credit option.

The impetus to form the STEP network came from superintendents of small, rural school districts in ESD 101's service area. In late summer of 1985, ESD 101 administrators were approached by a number of school superintendents in the service area asking for help in delivering high school credit courses in curricular areas where it was difficult to either locate or recruit certified teaching personnel, primarily in the foreign languages and mathematics.

ESD 101 officials had previously considered distance education as an alternative to provide smaller schools with added course offerings. Numerous options including TV courses delivered via microwave, fiber optics, cable, and satellite were considered. EDS administrators wanted the capability to broadcast to the entire state of Washington, and for that reason selected satellite. At about the same time, Eastern Washington University (EWU) at Cheney, located 20 miles south of Spokane, had purchased a satellite uplink with plans to offer college classes and business training. An agreement was reached with EWU, beginning in September 1986 to offer four high school courses over satellite. Classes that first year were all taught from a temporary studio on the EWU campus. As stated by Ted Roscher, STEP

Director, "13 original colonies" joined the network to start its first year on-the-air. Two other districts joined these 13 sites before year's end. All sites in the first year were in Washington. By the end of the second year, STEP's membership had grown to over 40 districts. Several districts in neighboring states had also joined. Many more were showing interest.

During the first two years, all classes and inservice programs were uplinked from the EWU campus at Cheney. The temporary studio did not meet broadcast specifications desired by STEP administrators. At the end of the 1987-88 school year, ESD 101 entered into a five year contractual agreement with RXL Communications in Spokane. STEP offices are now located in the same building as RXL Communications, a 12,000 square foot, privately owned broadcast center.

Description of Technology Utilized and Programming Provided

STEP is a one-way full-motion video, two-way audio network. Students at receive site locations can see their TV teacher, but are unable to see students at other sites. The teacher has no visual contact with students at any site. Audio contact from remote sites to the studio is possible over regular telephone lines during lesson broadcasts. Direct student communication initiated from one remote site to another remote site, however, is limited. Four outside telephone lines feed into the studio. As a result, a maximum of four sites can be connected aurally with the studio at any one time. In such a configuration (much like a telephone conference call), students are able to talk directly to the teacher or to students at any of the other three sites which are concurrently on-line. Other students can hear the discussion between their classmates and teacher, but are cannot join in the discussion until a line becomes available.

Telephone access is on a first come basis. The student who dials first is the one who gets into the studio. Students merely press a button on the telephone which has been programmed to automatically dial a toll free ("800’) number into the STEP studio. If a line is open, it takes approximately 10-15 seconds for the connection to be made. During observation at remote site schools, it was noted that students were not always able to "get in" to the studio on their first call attempt because another student elsewhere was also calling. Students reported that in some instances they had to make two or three attempts before successfully calling the studio during class time.

STEP uses a Ku uplink which is capable of transmitting in either a half or full transponder format. The RXL Communications center has a state-of-the-art broadcast studio from which all programming originates. One-way video and audio signals are transmitted from the studio to a G-STAR III satellite over a full transponder (transponder 3). The signal is not scrambled. Talk-back from students is possible over four separate telephone lines which feed into the studio. Phone calls during broadcasts are received by an engineer in the studio, who screens all calls, then prints the name of the student and site location on the teleprompter in the studio to alert the teacher. The call is then entered into the studio for audio broadcast to all sites. RXL engineers use a mixed-minus system to reduce the echo of students' calls as they are received in the studio before being carried over the satellite. Careful coordination must occur between the studio teacher and the engineer regarding the acceptance of calls. In most cases, the teacher controls the pace of her lesson and indicates to students when it is appropriate to call in. Cues such as, "Let me explain this point for 10 minutes before you call in, " or "Okay, I would now like to respond to questions," etc. notify students when it is appropriate to call.

At the local sites, students gather around a 25" television monitor to watch the TV lesson. Receive site classrooms are equipped with one or two telephones, shared among students, for use in calling the STEP studio.

Television production and broadcast equipment specifications at the on-site studio include: 2 Hitachi EP-CI CCD cameras, 1 Hitachi FP-C1H graphics camera prompter system, Grass Valley Model 100 switcher, Larid 1500 CG, Broadcast Audio System 12 audio console, 3 Gentner DH telephone interfaces, ClearCom intercom and IFB systems, Sony VO-9600 3/4" tape recorder. A Hitachi EP-C1/Sony VO 6800 field production unit and Sony VO 5850 3/4" edit system are also available.

Satellite uplink equipment include: 2 Harris Ku video exciters, capable of both half and full transponder formats with 6.2 and 6.8 MHz audio subcarriers. The exciters meet RS-250 standards for video performance. The exciters feed two Varian 300 watt TWT amplifiers with a switching system for double tread transmission or hot stand-by feed. The antenna system is an Andrew Corporation ESA-124B 5.6 meter antenna with a four port feed system. This uplink system is capable of two simultaneous feeds to one satellite in any combination of polarizations. It can uplink to any domestic Ku band satellite except SPACENET II. The downlink capabilities at the studio include two Andrew ASR-300 Ku band receivers on the main dish, with provisions for a third receiver. The downlink can receive polarizations for two simultaneous Ku band receptions.

Programming

STEP broadcasts high school classes Monday through Thursday, four days each week, 144 calendar days during the academic year. Classes begin the first week in September and run through the end of May. In its first year, classes were aired five days each week, but shifted to four days the second year. The decision to denote Fridays as a non broadcast day was made in consultation with user schools. An open day gives local schools the freedom to let students catch up on homework assignments, take tests that have previously been sent from STEP, or allows for review of content presented earlier in the week. If students have missed a class due to illness or a scheduling conflict during the week (eg. sports activity, assembly, etc.), Fridays are used to watch a videotape of the missed class. On Fridays, STEP personnel are usually available in their offices to answer phone calls from students or classroom coordinators at the schools who may have questions on lessons presented previously. On the four broadcast days, classes are aired 50 minutes each day with 45 minutes of live instruction. Five minutes are allowed at the beginning of each class for the on-site classroom manager (coordinator) to check attendance, collect assignments, and otherwise conduct the day-to-day detail of the class. During the five minutes allotted to the classroom manager, STEP broadcasts a color-bar to the schools with a notice that the satellite class will soon begin.

Five high school classes are offered: Pre-calculus, Japanese I, Advanced Senior English, Spanish I and Spanish II. All classes meet Washington state curriculum standards. Each high school credit class offered can be taken in a dual credit format (both high school and college credit). Students who elect to enroll for the college credit option pay the college tuition fee. Enrollment totals at the beginning of January 1989, showed Spanish I as the highest enrolling course (302 students), followed by Japanese I (274), Spanish II (123), English (107), and Calculus (49). For the 1988-89 school year, the average student enrollment at the remote site locations for each class has been Spanish I, 11 students; Japanese, 9; Spanish II, 8; English, 5; and Calculus, 4.

All STEP high school teachers hold Washington State teaching certificates. Reciprocity agreements for teacher certification exist in the states receiving STEP high school courses. Each teacher also holds adjunct faculty status with one of the area's local community colleges (Gibson, 1989). This relationship allows classes to be offered on the basis of dual credit. Teachers were recruited from the Spokane area. Coincidentally, all have a minimum of seven years teaching experience in the regular classroom before beginning to teach over TV. The Japanese language teacher received a Fulbright Scholarship for the summer of 1987 to spend six weeks at Tokyo University to study advanced teaching methods. Only one teacher has been replaced in STEP's three years of broadcasting.

Teachers attempt to make occasional visits to some of their remote site students in an effort to get to know students personally and become better acquainted with principals and classroom coordinators at subscribing schools. This is occurs mostly in Washington or at sites in neighboring states that are within a 200-250 miles radius. Visits, when the are made, usually occur on Friday when teachers are not presenting a lesson in the studio.

The network offers some 20 staff development programs, four of which have the option of college credit attached. Recent legislation in Washington stipulates that teachers must earn 150 clock hours of state approved continuing education every five years. All inservice programs offered by STEP can be applied toward the state requirement. Some of the current titles for staff development offerings are: Thinking and Writing Across the Curriculum, How to Improve Student Attitude and Discipline, Sixty-Three Ways to Teach Anything, Collaborative Teaching, etc. Nationally known educators have typically been selected to teach inservice courses.

In addition to high school credit, college credit, and staff development courses, the network offers a limited number of student enrichment classes at the elementary and junior high level and a few adult level community education courses.

Organization Structure and Program Costs

The production and broadcast of STEP programs is a public-private partnership between RXL Communications and ESD 101. RXL Communications has a five year contract to provide professional broadcast services which includes helping teachers develop communication skills in presentation over television. According to Jason Vingelen, RXL vice president and general manager, "You can't just walk in front of a camera and start to talk. Our major role is integrating the teachers' teaching skills with the broadcast medium. The producer and director show them how to use the set [studio], how to move across the set. We emphasize the importance of maintaining eye contact with the camera and projecting an image that personalizes their instruction to the students. We don't want any of the broadcast or teaching of the teacher to look clumsy. The students will recognize clumsy programming and judge the qualify of instruction accordingly."

STEP's role in the partnership with RXL is to provide quality instruction for students. The partnership was formed following STEP's first two years of broadcasts with Eastern Washington University. As the number of receive sites grew and programming expanded, especially in the area of staff development, STEP outgrew the facilities and services available from EWU.

Five full-time and four part-time staff from RXL have been assigned to work with STEP. All employees have varied backgrounds working in broadcast television -- the producer, director, broadcast engineer, audio engineer, and general manager.

The RXL studio operates like a network TV newsroom. Teachers use the studio's teleprompter; the chromakey with its font, rolling video, still picture, white board and other visual features; the character generator, etc. Before broadcast, each teacher meets with the producer to conduct a "TV rundown." The rundown outlines how the lesson will proceed, the various TV "shots" that will be included in the program, movement across the set by the teacher, how visuals will be incorporated, and all other aspects of the lesson that will help the director and engineer coordinate the broadcast. As stated by Vingelen, "We want the student to see that the teacher looks smooth, comfortable, under control, and professional in front of the camera." The camera operator and the engineer handle all of the equipment while teachers are teaching. All video, graphics, and other instructional materials needed for lessons are prepared at RXL's production facility

According to Ted Roscher, the partnership with RXL has been invaluable in developing quality programming: "The best TV critic today is the student. He's grown up with it [TV]. If he doesn't like it at home, he either changes channels or turns it off. If he doesn't like it in school, he turns it off mentally."

The STEP high school program operates as a mini high school. One satellite teacher who holds a Washington state school principal's credential acts as STEP principal and manager. The other four teachers are under her supervision. The principal conducts performance evaluations, required by the state, on each teacher.

Working with each of the five STEP teachers are part-time assistants who help grade student papers and answer questions over the telephone raised by students or classroom facilitators at the remote sites. Known as "telephone answerers and graders" (TAGs), these individuals serve in a support role for students at the remote sites. One TAG is assigned for each 30 students enrolled in a course. Students have the same TAG throughout the semester. Students know that they can talk to the same person each time they have a question or concern about the course. During the lesson broadcast and specified non-broadcast hours, the TAGs are available at the STEP offices to answer student questions. TAGs work eight hours per week. Students can call from the school or from their homes to reach their respective TAG. The TAGs are typically certified teachers in the subject area who are not teaching full-time or graduate students at one of Spokane's universities. Each STEP teacher supervises up to a total of six TAGs as well as the locally appointed classroom coordinators. (See Appendix A).

If the class enrollment goes above 200 students, a second certified teacher is added to assist the STEP instructor. Beneath this teacher, a second group of TAGs are organized at the ratio of one TAG for every 30 students. The STEP satellite teacher would then be responsible for direct supervision of her original six TAGs, the classroom coordinators, and the certified teacher. For the second group of 200 students, the certified teacher would assume supervision of the additional TAGs and the classroom coordinators in the schools. (See Appendix B). Although no class has yet enrolled more than 200 students, STEP administrators feel that with this type of organizational-structure, classes could be as large as 500 students and still offer a personalized support system for each group of 30 students. This support system distinguishes STEP from any of the other satellite systems. As stated by Ted Roscher, "There is no other satellite vendor broadcasting high school credit courses with this kind of personalized support system."

Program Costs and Funding Sources

In its first year with Eastern Washington University, STEP broadcast courses 5 days per week, 180 days per school year. First year budget requirements were estimated as follows:

> The entire project had projected its budget needs on an average class size of five students per year. We also projected that we needed ten school districts in the program the first year to make it a feasible project. For two hours of programming daily for 180 days, the actual cost is somewhere in the area of $200,000. When we first developed the project, we knew that approximately $15,000 per district would be the maximum that a district could afford. The budget, therefore, would be approximately $40,000 short if only ten districts had participated. However, it was agreed that the Education Service District and Eastern Washington University would support the project in the initial year for any shortfall. We would then recover our costs as more districts joined the project the second and third years. We did add two additional courses late in the year, giving the districts additional choices from which to select their two primary classes.
>
> (personal letter to Bruce Barker from Ted Roscher, October 7, 1986)

Fifteen schools joined the network by the end of the first year avoiding any significant shortfall to either ESD 101 or EWU.

STEP operates as a public, non-profit cooperative. Costs are distributed among users. With growth in membership, increased revenues have offset some of the network's operating costs. These savings have been shared among co-op members by an approximate decrease of 15 percent over the past year in charges for inservice programming to subscribing schools. Per Ted Roscher, "STEP operates as a co-op. As we are able to save money, those savings will be passed on to our members."

STEP pays $400 per hour to transmit on a full transponder (uplinking to the satellite). For the 1988-89 school years, this is five high school classes each broadcast for 50 minutes 144 days per year; 20 hours of student enrichment; and 80 hours of staff development. The total expense for transponder time approximates $280,000.

STEP's operational budget is financed from local districts through installation, annual subscription, and tuition fees. The director's salary is paid by ESD 101, but all teachers, TAGs, support personnel and the contract with RXL is financed through funds provided by the districts. According to Roscher, "No special funding -- not one dime --

has come from state or federal sources to support STEP programming." To assist in program growth and help reduce costs to users, plans for future development are likely to include requests for external grants and support.

ESD 101 makes available to new subscribers an equipment package which includes a downlink satellite dish and associated TV classroom and telephone equipment and maintenance. Districts can either purchase equipment through ESD 101 or make arrangements to obtain their own. In either case, first year capital equipment items required at the local school are likely to range between $5000-$6000. STEP recommends a 2.8 meter steerable downlink dish that is equipped with both a Ku and C band feedhorn. Local schools then have the flexibility to "pick up" additional satellite programs besides STEP.

New members pay a $4750 first year membership fee. Renewing members are charged $3000 annually. Membership fees are higher for districts who elect *not* to receive staff development. For new members in this category, the charge is $6000 and for renewing members it is $4750. The increased charges are assessed to help defray to other co-op members' expenses associated with providing staff development and enrichment programs.

Tuition costs for high school credit courses are dependent upon the number of students at the local school enrolled in any one course. The per student/course/year enrollment charges are as follows: 1-3 students, $650 each; 4-5 students $2450 total; 6-12 students, $3900; 13-20 students, $4850; and for over 20 students the charge is $4850 for the first 20, plus $220 for each additional student.

Participation in student enrichment programming is optional. Costs are assessed on a per program fee of $350 or $1000 for a total package of 10 programs.

Costs to receive all inservice programs are determined on the number of certified staff members employed by the district. The breakdown is as follows: 1-50 certificated staff, $1750; 51-100, $2750; 101-150, $3750; 151-200, $4750; and 201 or more, $5750. (See Appendix C).

Role and Responsibility of STEP and of Local School Districts

Unlike most secondary teachers in traditional classrooms, STEP satellite instructors each teach only one class period per day, but work full-time for ESD 101. The extra non-teaching time is spent supervising TAGs, coordinating with on-site classroom coordinators, reviewing student materials, and preparing for future lessons. They are salaried full-time by ESD 101 at a rate comparable with other teachers in Washington.

STEP teachers reported that teaching over television -- if one was to be effective -- required much more time in planning and preparation than did teaching in a traditional setting. Teachers work closely with a professional TV producer, director, and engineer from RXL Communications to present a professional image across the TV screen. With help from the RXL producer and director, STEP instructors purposely plan a variety of teaching methodologies and TV shots to keep the flow of the TV lesson moving. As stated by Penny Cooper, STEP principal, "In order to do this kind of teaching well [TV teaching], you've got to have a very polished presentation." As an example, a class might begin with a very short video clip (videotape) or picture intended to introduce students to the main idea of the lesson. The teacher may use the chromakey (much like a TV weatherman) to highlight or explain important information. Notes for students might be displayed on the character generator or commercially prepared visuals on the overhead camera. Movement of the teacher across the studio is planned and may include camera close-ups at the podium, wide-angle shots at a desk, etc.

Instructional design for lesson presentations follows a mastery approach model. Again, according to Penny Cooper, "We try to design our lessons so that each student's interest is captured at the very beginning. We also want them to know the objectives and see the material presented in a clear and understandable manner. For each lesson we like to provide opportunities for students to interact with questions and comments. If students do not call in, then we purposely call on specific students to phone in."

Exchange of materials between STEP offices and students at remote sites is chiefly through the U.S. mail system. Occasionally, materials are sent via overnight express. Costs for all materials going out from STEP are paid for by STEP. Postage for materials mailed from the schools to Spokane are paid by them. Satellite teachers and TAGs try to follow a policy of 48 hours turn-around time to grade and return student materials mailed to the STEP offices.

Individual student grades are updated on a cumulative basis each week by STEP satellite teachers and TAGs. STEP can thereby report student grades to specific schools in a manner that accommodates their time schedule for sending report cards to students and parents.

Student absenteeism from satellite classes is dealt with at the local school level. All remote site classrooms are equipped with videotape equipment and STEP member schools have rights to tape all high school programming. Schools are encouraged to tape classes whenever a student is absent. The

Friday open day is often used for student viewing of a class that might have been missed earlier in the week. Occasionally, weather interference (heavy rain or snow) directly over a Ku band downlink dish will cause a loss of TV reception at a school. Though infrequent, weather related problems do occur. Videotapes are supplied by STEP, upon request, for any classes that are missed.

STEP has organized a Steering Committee whose membership consists of representatives of each subscribing school district. Decisions for high school classes and inservice programs are made by STEP administrators in consultation with the Steering Committee. The Committee also discusses STEP operational practices and polices that impact local schools. A matter of continual concern is bell schedule differences among schools. Another matter has been fear than the technology might replace teachers. Ted Roscher has commented, "We have no intention to replace teachers. If you already have a good teacher in the classroom, then that is exactly the way you should go. The problem with distance education is that it came on the scene rather quickly as the regular teacher viewed it, and suddenly some teachers felt threatened -- that it was going to replace them. We told the teacher unions in Washington that satellite technology is a way to solve a particular problem. That problem being the lack of qualified teachers to teach math, sciences, foreign languages and specialized courses in the smaller schools. We have not gotten into social studies or a lot of other subjects where there are already teachers available."

Subscribing school principals appoint classroom coordinators. In most instances, the coordinators are teacher aides, but at some schools certified teachers (not in the subject area of the satellite course) who have an extra preparation period assume the role of coordinator. The major duties of coordinators are to take attendance, hand out and take up assignments from students, grade tests that are to be checked in class (major tests are all mailed to Spokane), record student assignments, turn the equipment on and off, maintain student discipline, and identify and refer student problems to the satellite teacher. Lesson plans and student materials are mailed weekly to classroom coordinators from the STEP teachers.

Enrollment of students into satellite courses is left to the discretion of local educators. Since each of the courses are offered with a dual credit option, STEP suggests that prospective satellite students be self-starters and independent learners who demonstrate a high level of intrinsic motivation to learn.

Evaluative Data

After its second year of satellite broadcasts, STEP asked participating high school students then in the program to express their opinions about satellite classes. The overall response from students was very positive, however, they did offer some suggestions for improvement. In the Advanced Senior English class, for example, a selection of student comments as to perceived strengths were: "the class is different; we have fun; [the teacher] never has a dull moment to allow for possible sleeping; I am reading a lot of books I wouldn't read in a regular class; finally [I'm] learning how to write a paper; thinking on a higher level; the active use of Bloom's Taxonomy is very beneficial; the graders just don't mark thinks wrong, they give suggestions for improvement;" and "college preparation."

Some of the student suggestions for improvement were: "have better [background] music; give more direction for what to study for on tests and quizzes; slow down; return papers sooner; provide more discussion about what we are reading; remind [classroom] coordinators what should have been mailed to them for this week; more one-on-one time with [the STEP teacher];" and "give more time to call in." These comments from students are representative of those made in the other STEP high school courses.

Survey Data

A total of 302 questionnaires were returned. These included 20 administrators, five tele-teachers, 59 regular classroom teachers (teachers not directly involved with the tele-system), 28 facilitators and 190 students (see Appendix E for a summation of user responses).

Responses From Administrators

The average enrollment of the schools was 316 students. An average of 14 students at each site were taking one or more tele-courses. The administrators averaged 3.5 hours evaluating the tele-system the previous semester. They felt that the parents and the school boards in their districts were supportive of the use of tele-teaching. On a scale of "1" equals "poor" to "5" equals "excellent", the administrators rated the quality of student learning via tele-courses at "4" and the overall benefit of the tele-courses to their schools' instructional programs at "4.4". They also felt that the tele-courses were cost effective in terms of student learning.

When asked to list the strong points of the tele-learning system, each of the administrators listed expanded curriculum offerings. Six listed the ability to offer college credit courses. Three said that the system helps alleviate the teacher shortage and that there was the possibility of using the system for teacher in-service. As weak points of the system, three administrators expressed concern over schedule coordination. Three others indicated that minor technical difficulties could be a problem. Two reported slight opposition from the teacher union.

Responses From Tele-teachers

The five tele-teachers had an average of 13 years teaching experience. Their level of education ranged from a bachelor's degree to a master's degree. They felt that the number of students in their tele-classes was within manageable limits for effective instruction. The tele-teachers reported spending an average of four and a half hours in preparing a daily lesson plan for a tele-course and estimated that it took five to seven days for homework to be graded and returned to the students. The tele-teachers received two telephone calls from the parents of students each semester and called a parent one or two times each semester. None of the tele-teachers felt that they replace regular classroom teachers. Each of them agreed that preparing lesson materials for their tele-courses was much more time consuming than preparing lesson materials for a regular class. They said that students at different sites interacted with each other very little during the tele-course. When asked to describe how a tele-class was different from a regular class, four said that the tele-class required more visual aids and a greater variety of activities in order to keep the students' attention. Three said that a tele-course required more prep time. Two said that student feedback was limited.

Responses From Regular Classroom Teachers

Thirty-one of the teachers had observed one or more of the tele-classes in progress. On a five point scale where "1" was "poor" and "5" was "excellent", the regular teachers rated the quality of instruction provided the tele-students at "3.64". Eighteen of the teachers had received inservice training over the system and rated the experience at "3.35". They did not feel that offering courses via tele-teaching would reduce job opportunities for regular classroom teachers.

When asked to list the strong points of the tele-courses, 71 percent of the regular teachers felt that the ability to expand the schools' curriculum offerings was important. Fourteen percent said that the tele-courses offered new ideas and a challenge to the students. Twelve percent felt that the opportunity for students to gain college credit via tele-courses was important. As weak points of the system, 29 percent of the regular teachers felt that there was not enough interaction between the tele-students and the tele-teachers. Fifteen percent said that scheduling was a problem. A few teachers also mentioned technical problems and the slow return rate on homework.

Responses From Facilitators

The facilitators had an average of five hours training for their position. They did not feel that tele-courses were more difficult for the students than traditional courses. They felt that the students might do better in a traditional class. They also said that cheating on tests or assignments occurred infrequently in the tele-courses.

When asked about the system's strong points, 64 percent of the facilitators said that it expanded the school districts' curriculum offerings. Thirty nine percent felt that the quality of the tele-courses and tele-teachers was a strong point. Twenty one percent said that the tele-courses would provide the students with college credit.

Responses From Students

If given a choice between taking a regular class or a tele-class, 26 percent of the students said that they would take a tele-class. The students estimated that they asked a question or made a comment in the tele-course seven or eight times per week, and that the tele-teacher called on students about three or four times per week. Most of the students indicated that the tele-courses were a little more difficult than a regular course. They also reported that they did not get to know the students in the distant classes as well as the students in their regular classes.

When asked to list the system's strong points, 23 percent of the students said that the system provided access to college credit courses. Twenty percent said that the system's ability to expand the curriculum was important. Seventeen percent said that the potential for meeting students and teachers from other schools was important. As for the system's weak points, 33 percent of the students said that it was difficult to contact the tele-teacher and get personalized attention. Thirty three percent said that the pace of the class did not match most of the students' needs. Twenty five percent reported that it was hard to ask questions.

Plans for Future Development

STEP officials have been cautious about the network growing so large that it becomes unmanageable. Ted Roscher, STEP director has stated, "We're going to be very careful with expansion. I think there is a certain number of students that you can serve effectively. I don't know exactly what that number is, but once we get to 300 sites, we may have reached our maximum without restructuring how we are organized." STEP is also committed to continue to operate the network as a non-profit cooperative. As the number of member school districts grow, which off-sets operating costs, savings will be shared among schools in the form of reduced programming fees.

Program plans for the coming year are to add two new high school courses, Japanese II and a laboratory science course yet to be decided. For a science course to be successfully taught via satellite, STEP administrators believe that the remote site classroom coordinator will have to have some background or training in science. For example, if a physics class is offered, the coordinator should be the school's science teacher. Future plans also include an expansion of inservice programming and more enrichment courses, especially in civics and sciences.

According to ESD 101 Superintendent, Brian Talbott, the notion of offering an array of enrichment classes in the civics arena is particularly exciting (Talbott, 1989, p.2):

> We have already had preliminary discussions with members of the U.S. House of Representatives and U.S. Senate from Washington and other participating states about a rotating schedule of satellite appearances live from Washington, D.C., where students could ask questions about federal government and current issues.
>
> Also in the discussion stage are live broadcasts from Olympia with state government and legislative leaders.
>
> And, in the international arena, the feasibility of a live hook-up between our Spokane studio and one in Japan to allow our Japanese language students a

chance to meet and talk with their counterparts is being explored.

Long term development plans for the STEP program are intertwined with a state-wide video telecommunications program, initiated by the Washington Legislature, that hopes to link K-12 public schools, higher education, and state government. Known as the Triad Plan, leaders in the state legislature propose the purchase of 306 downlinks and classroom TV equipment in order to placed one downlink for every school district in the state (or a telecommunications grant for districts that have already invested in a system), every educational service district, and at the Office of the State Superintendent of Public Instruction.

For higher education, the plan calls for the purchase of 36 downlinks, one for every community college and public four year institution in the state. And, 72 downlinks to be installed at major state agency locations across Washington. Two or three different locations -- one of them being STEP's Spokane office -- will probably be used to uplink programs (see Appendix F).

State elected officials believe that once downlinks have been installed at every school district, all community colleges, each public four year higher education institution, and at major state offices, the potential will then exist for a state-wide interactive system that will (Talbott, 1989, p.1):

1. Allow for two-way, state-wide public access to legislative hearings;
2. Allow legislators to hold community meeting from Olympia;
3. Allow state agencies to conduct teleconferences and in-service training;
4. Allow higher education to coordinate classes; and,
5. Allow K-12 education to offer courses where it is difficult to obtain or retain certificated staff who are endorsed to teach in that subject area.

Summary

STEP's telecommunications via satellite delivery system was set in place by ESD 101 administrators who saw it as a cost-effective measure to help small, rural school districts expand curricular offerings in critical subject matter areas. Staff development and inservice programs were also made available to member districts saving expenses related to travel, per-diem, and substitute teachers. No attempt has been made to replace teachers.

The system uses a one-way video, two-way audio format. Students can see the instructor and there is opportunity for student-teacher contact during and after class via a toll-free telephone number. Satellite delivery is not affected by terrain. Schools in remote, isolated, or mountainous areas receive a signal of the same quality as those in large cities or the wide open spaces. The only technical difficulty, other than fine tuning of equipment, has been weather related. When a relatively large amount of ice or snow is deposited on the downlink dish, it needs to be cleaned in order to restore signal quality. Also, at one site a colony of hornets temporarily attached their nest behind the downlink's feedhorn. "We contacted STEP about periodic loss of the TV signal and thought the dish needed slight adjustment. Upon investigation we found the hornets' nest behind the feedhorn. Once we removed the hornets, a clear picture returned on our TV," reported Steve Waunch, principal of Selkirk School District.

References

Robert Gibson. "Closing the Gap: Distance Learning by Satellite Keeps Rural Schools Competitive and Open." *Rural Electrification*, January 1989, 26-30.

Ted Roscher (personal communication to researcher, October 7, 1986)

Brian L. Talbott. "Legislature Takes Leadership with Coordinated State-wide Telecommunications Plan." *Focus* (a publication of Educational Service District 101), Volume 3 Number 7, 1-2, March 1989.

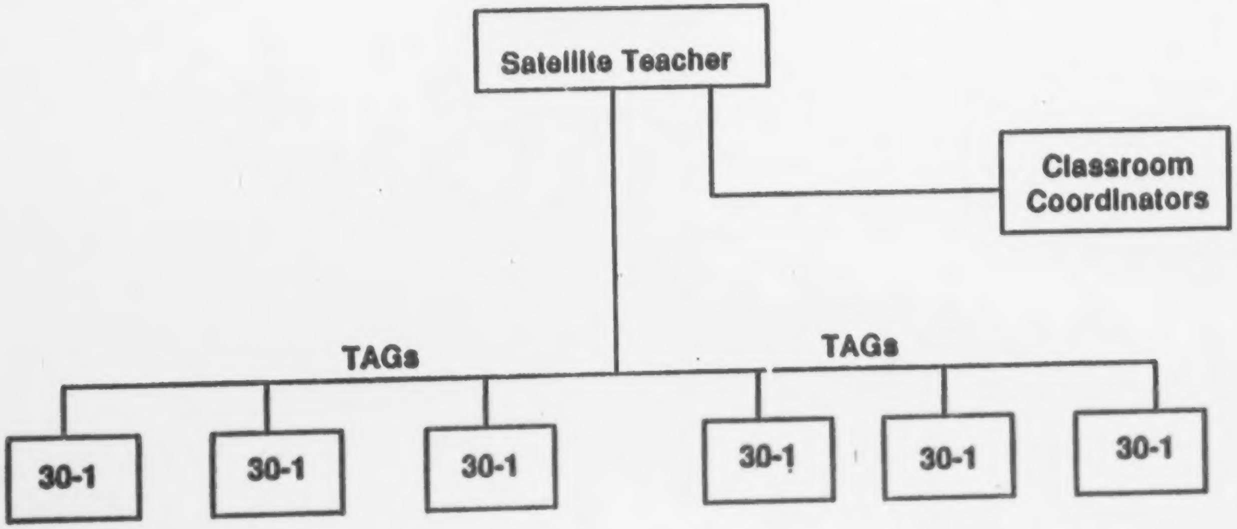
Appendix A

Appendix A

SATELLITE TELECOMMUNICATIONS EDUCATIONAL PROGRAMMING (STEP)

Support System

First 200 Students



Satellite Teacher

Classroom Coordinators

TAGs

30-1

30-1

30-1

TAGs

30-1

30-1

30-1

TAG's - Telephone Answerers/Graders

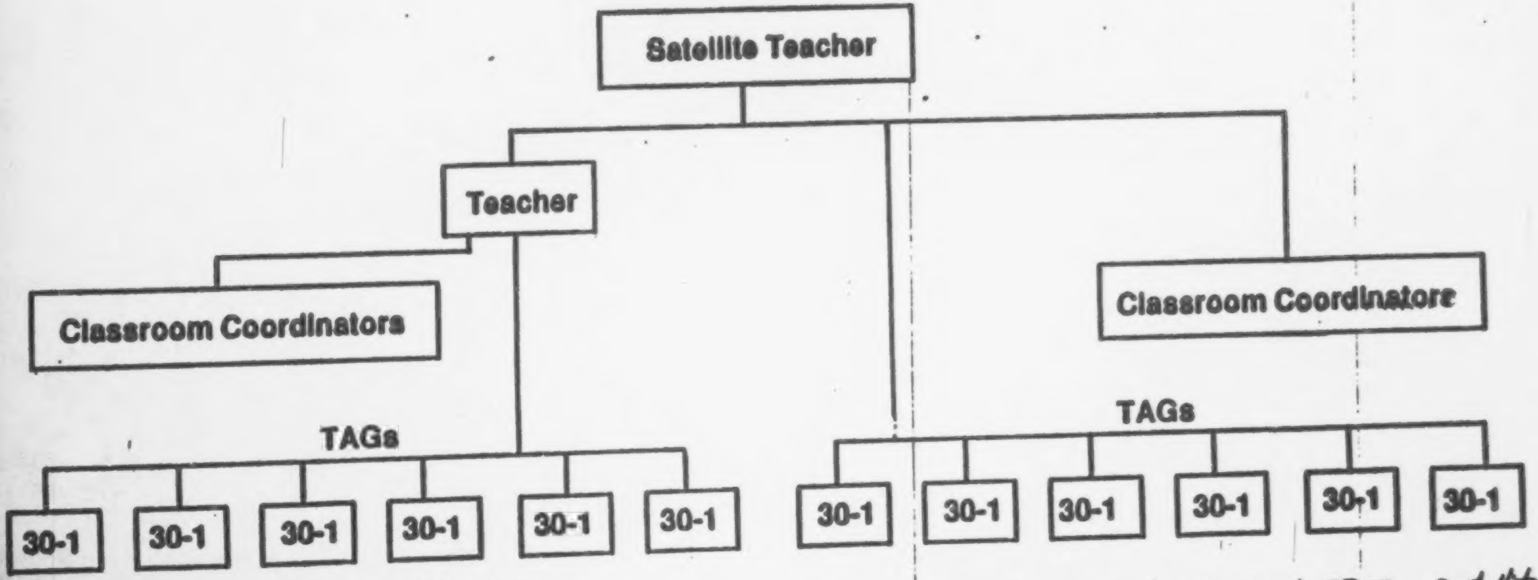
Organization chart showing STEP satellite Teachers' supervisory relationship with "telephone answerers and graders" and with on-site classroom coordinators. for a class with an overall enrollment fewer than 200 students.

Appendix B

SATELLITE TELECOMMUNICATIONS EDUCATIONAL PROGRAMMING (STEP)

SUPPORT SYSTEM

Second and Consequent 200 Students


Satellite Teacher
Teacher
Classroom Coordinators
Classroom Coordinators
TAGs
30-1
30-1
30-1
30-1
30-1
30-1
TAGs
30-1
30-1
30-1
30-1
30-1
30-1

TAGs - Telephone Answerers/Graders

Organization chart showing STEP satellite teacher's supervisory relationship a second certified teacher, "telephone answerers and graders" and with on-site classroom coordinators for a satellite class with over 200 students enrolled.

Appendix B

APPENDIX C

Program Fees, April 1989

Membership:

New Member	$4,750
Renewing Member	$3,000

Inservice/Enrichment:

1-50	Certificated Staff	$1750
51-100	" "	$2750
101-150	" "	$3750
151-200	" "	$4750
201 or more	" "	$5750

Student Enrollment/Per Course/Per YEAR

1 to 3 students	$650 each
4 to 5 students	$2,450
6 to 12 students	$3,900
13 to 20 students	$4,850
Over 20 students	$4,850 for 1st 20 students, plus $220 for each additional student.

Equipment:

STEP suggests a steerable dish, at least 2.8 meters in size and that is equipped to receive both Ku and C band signals. Estimated costs for downlink and TV classroom equipment ranges between $4750 — $6000.

Appendix D

Estimate of Costs to Receive Tele-courses Via Satellite From the Perspective of Member Schools Participating in the Satellite Telecommunications Educational Programming (STEP)

Equipment and installation:	5,000.00-6,000.00	
Subscription fee:	4,750.00	first year (6,000.00 if inservice and enrichment courses are not used)
	3,000.00	each year after the first year (4,750.00 if inservice and enrichment courses are not used)
Tuition:	650.00	per student for 1-3 students
	2,450.00	for 4-5 students
	3,900.00	for 6-12 students
	4,850.00	for 13-20 students
	4,850.00	+ 220.00 per student over 20
	1,750.00	for 1-50 certified staff
	2,750.00	for 51-100 certified staff
	3,750.00	for 101-150 certified staff
	4,750.00	for 151-200 certified staff
	5,750.00	for 201+ certified staff

Personnel: Facilitator for each classroom

Appendix E

Results From STEP Questionnaires

Administrator Questionnaire
(20 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. ESTIMATE the total enrollment of your school. Avg. = 316

2. ESTIMATE how many students in your school are enrolled in satellite courses. Avg. = 14

3. Describe the academic level of students participating in satellite courses.
   a) mostly "A" and "B" students = 16 students
   b) mostly "C" students = 1 student
   c) mostly "D" and "F" students = 0 students
   d) all types of students = 3 students

4. How would you describe the classroom manager/facilitator of tele-courses?
   a) certified teacher in subject area being taught = 6 facilitators
   b) certified teacher, but not in subject area being taught = 10 facilitators
   c) teacher aide = 9 facilitators
   d) volunteer = 0 facilitators
   e) other = 0 facilitators

5. ESTIMATE the number of hours you spent last semester observing the satellite course(s) in your school. Avg. = 3.35

Based on your experience with students being taught via satellite, answer the questions below, using the following five point scale:

	Strongly Disagree				Strongly Agree
	1	2	3	4	5
6. The quality of the satellite courses in our school is as good as the quality of our regular teaching.	Avg. = 3.7				

7. Regular classroom teachers in our school feel their jobs are threatened by "distance education" instruction. Avg. = 2.15

8. The teacher union (or state teachers' organization) in our state is supportive of the use of satellite teaching in our school. Avg. = 2.74

9. Parents in our district are supportive of the use of tele-teaching in our school. Avg. = 4.25

10. Our school board is supportive of the use of satellite teaching in our school. Avg. = 4.5

Rate each of the following items on the basis of "Poor" to "Excellent":

Don't Know 0 Poor 1 2 3 4 Excellent 5

11. Attitude of students toward satellite courses. Avg. = 3.75

12. Attitude of students toward satellite teachers. Avg. = 3.75

13. Quality of student learning achieved via satellite learning. Avg. = 4

14. Overall attitude of teachers in your school regarding quality of courses taught via satellite teaching. Avg. = 3.65

15. Use of audio-visual aids in satellite courses (e.g. pictures, overhead transparencies, films, videos, etc.). Avg. = 3.54

16. Benefit of satellite courses to your school's instructional program. Avg. = 4.4

17. Cost effectiveness of satellite courses -- that is, has the learning achieved by students been worth the money? Avg. = 3.9

18. Do you formally evaluate the satellite teachers in the same way you evaluate the regular teachers?
    a) yes = 4 formal evaluation
    b) no = 16 formal evaluation

19. What are the two or three major benefit(s) of satellite courses for your school?

    1. Ability to expand curriculum. = 20 responses
    2. Ability to offer college prep courses. = 6 responses
    3. Ability to provide teacher inservice and help alleviate teacher shortage. = 3 responses

20. What, if any, have been the major problems you've encountered?

    1. Schedule conflicts. = 3 responses
    2. Minor technical difficulties. = 3 responses
    3. Overall effectiveness, expensive, discipline, opposition from teacher union, low student-teacher interaction. = 2 responses

Tele-teacher Questionnaire
(5 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. How many years have you taught school? Avg. = 12.6 years

2. How many years have you been teaching TV courses? Avg. = 2.6 years

3. Do you teach any regular classes?
   a) yes = 0 responses
   b) no = 5 responses

4. What is your highest college degree? Bachelors = 2
   Masters = 3

5. Did you receive training for your TV teaching assignment?
   a) yes = 2 responses
   b) no = 3 responses

6. How many students are enrolled in your TV course(s)?
   Avg. = 149 students

7. How many sites are there in your TV course(s)? Avg. = 21 sites

8. When working with the interactive teaching technology, are you able to recognize each of your students and call on them by name?
   a) yes = 3 responses
   b) no = 2 responses

9. ESTIMATE what you think is the ideal class size (all sites combined) for a distance education class. Avg. = 106 students

10. At what point do you think class size (all sites combined) becomes too large? Avg. = 160 students

11. ESTIMATE how long it takes, on the average, to prepare a daily lesson for your TV course. Avg. = 4.7 hours

12. ESTIMATE how many days it takes for students in your TV course to have their homework assignments/ tests graded and returned to them.
    Avg. = 6 days

13. For a typical tele-course, ESTIMATE the number of telephone calls you receive from parents of students during an average semester.
Avg. = 1.8 calls

14. For a typical tele-course ESTIMATE the number of telephone calls you initiate to parents of students during an average semester.
Avg. = 1.25 calls

15. Is your tele-teaching formally evaluated by school principals (or other administrators) at distant site locations?
a) yes = 3 responses
b) no = 2 responses

16. Is your TV course(s) mostly geared for
a) remedial students? = 0 students
b) average students? = 2 students
c) advanced students? = 1 student
d) mixture of all of these = 2 students

17. Do you receive a higher salary for teaching TV courses than you would if you taught in a regular classroom?
a) yes = 1 response
b) no = 4 responses

18. Do you have a reduced teaching load, as compared to a regular teacher, because you are a TV teacher?
a) yes = 1 response
b) no = 3 responses

19. What are the THREE most important ways that satellite teaching is different from regular classroom teaching?

1. It requires more visual aids and varied activities. = 4 responses
2. It requires more prep time. = 3 responses
3. There is no immediate feedback from the students. = 2 responses

Answer the questions below, based on the following five point scale:

Strongly Disagree — Strongly Agree
1 2 3 4 5

20. Tele-teaching technologies will replace regular classroom teachers.
Avg. = 1.67

21. Preparing lesson materials for delivery via tele-teaching technologies is much more time consuming than preparing lessons for regular teaching. Avg. = 5

22. Students in my tele-course(s) are assigned as much homework as students in regular classes. Avg. = 4.6

23. Student cheating on tests or assignments occurs very infrequently in my tele-course(s). Avg. = 3.2

24. Students at different sites frequently interact (exchange questions, comments, or otherwise talk back and forth with each other) during my tele-course(s). Avg. = 2.8

46

Regular Teacher Questionnaire
(59 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you aware that "distance education" courses are being taught in your school?
   a) yes = 57 responses
   b) no = 2 responses

2. Have you ever observed the distance education class(s)?
   a) yes = 31 responses
   b) no = 28 responses

   If yes, how would you rate the quality of instruction provided students (on a 5 point scale where "1" is "poor" and "5" is "excellent")? Avg. = 3.64

3. Have you taken any inservice training courses at your school that have been presented in a "distance education" delivery mode?
   a) yes = 18 responses
   b) no = 41 responses

   If yes, a) ESTIMATE the number of courses. Avg. = 3.5 courses

   b) Rate the quality of training presented (on a 5 point scale where "1" is "poor" and "5" is "excellent") Avg. = 3.35

   c) Did you interact with the tele-teacher during a course?
      a) yes = 8 responses
      b) no = 9 responses

   d) Did you interact with other teachers at your site during a course?
      a) yes = 13 responses
      b) no = 5 responses

   e) Did you interact with other teachers at other sites during a course?
      a) yes = 3 responses
      b) no = 15 responses

46

Regular Teacher Questionnaire
(59 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

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2. Have you ever observed the distance education class(s)?
   a) yes = 31 responses
   b) no = 28 responses

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   a) yes = 18 responses
   b) no = 41 responses

   If yes, a) ESTIMATE the number of courses. Avg. = 3.5 courses

   b) Rate the quality of training presented (on a 5 point scale where "1" is "poor" and "5" is "excellent") Avg. = 3.35

   c) Did you interact with the tele-teacher during a course?
      a) yes = 8 responses
      b) no = 9 responses

   d) Did you interact with other teachers at your site during a course?
      a) yes = 13 responses
      b) no = 5 responses

   e) Did you interact with other teachers at other sites during a course?
      a) yes = 3 responses
      b) no = 15 responses

4. Which type of inservice classes do you prefer?
   a) traditional inservice with an on-site trainer/instructor = 23
   b) training delivered via satellite = 6

Based on your knowledge of satellite courses offered to students at your school, answer the questions below, using the following five point scale:

Don't Know	Strongly Disagree				Strongly Agree
0	1	2	3	4	5

5. Satellite courses appear to be more difficult than traditional courses. Avg. = 3.33

6. Students would do better in a traditional setting. Avg. = 3.31

7. Students would rather take a satellite course than a course in a traditional setting. Avg. = 2.44

8. The satellite teacher seems to be personable with students (seems to convey a feeling of caring about students). Avg. = 3.38

9. The satellite courses will help students at our school get into college. Avg. = 3.82

10. Students typically have to work harder during a satellite course than in regular classes. Avg. = 3.05

11. Only certain students at this school are allowed to take a satellite course. Avg. = 2.89

12. Offering courses via satellite teaching will significantly reduce job opportunities for regular classroom teachers. Avg. = 1.87

13. Would you like to teach a satellite course?
    a) yes = 12 responses
    b) no = 241 responses

14. What are the two or three major strong points of the satellite teaching in your school?

    1. Ability to expand the curriculum. = 42 responses
    2. New ideas and a challenge for the students. = 8 responses
    3. Ability to offer college prep and credit. = 7 responses

15. What are the two or three major weak points of the satellite teaching in your school?

    1. Very little interaction. = 17 responses
    2. Scheduling conflicts. = 9 responses
    3. Minor technical difficulties. = 3 responses

16. ESTIMATE the number of times you have observed instruction on the satellite system in your school. Avg. = 3.2 times

Facilitator Questionnaire
(28 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you certified to teach in the subject being offered?
   a) yes = 6 responses
   b) no = 22 responses

2. How many satellite courses do you oversee? Avg. = 1.43

3. Are satellite courses at your school mostly geared for
   a) remedial students? = 0 students
   b) average students? = 10 students
   c) advanced students? = 19 students
   d) other? = 1 college student

4. Is the satellite system used for teacher in-service training?
   a) yes = 23 responses
   b) no = 2 responses

5. ESTIMATE the total number of hours you spent training for your tasks in the satellite classroom. Avg. = 5 hours

6. ESTIMATE the total number of times students in an average satellite class talk to the tele-teacher each week. Avg. = 19 times

7. ESTIMATE the average number of students in a satellite class at your site. Avg. = 8 students

8. ESTIMATE the average number of students in an entire satellite class (including all sites). Avg. = 123 students

Answer the questions below, based on the following five point scale:

Strongly Disagree — Strongly Agree

1 2 3 4 5

9. Satellite courses appear to be more difficult than traditional courses. Avg. = 2.9

10. Students would do better in a traditional setting. Avg. = 3.3

11. Students would rather take a satellite course than a regular course. Avg. = 2.36

12. The satellite teacher seems as knowledgeable as the regular teachers in this school. Avg. = 4.7

13. I can easily contact the satellite teacher if I need to. Avg. = 4.57

14. The satellite course will help students get into college. Avg. = 4.21

15. Students have to work harder during a satellite course. Avg. = 3.75

16. Only certain students at this school are allowed to take a satellite course. Avg. = 2.54

17. Homework assignments are returned to the satellite students more slowly than to the regular students. Avg. = 3.14

18. Student cheating on tests or assignments occurs very infrequently in this satellite course. Avg. = 4.75

19. What are the system's strong points?

    1. Ability to expand the curriculum. = 18 responses
    2. Good teachers and courses. = 11 responses
    3. Ability to receive college credit. = 2 responses

20. What are the system's weak points?

    1. Discipline can be a problem. = 8 responses
    2. Hard to reach the teacher outside class. = 7 responses
    3. Very little "hands on" experience. = 6 responses

Student Questionnaire
(190 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. What year are you in school?
   a) 9th grade = 13 students
   b) 10th grade = 50 students
   c) 11th grade = 60 students
   d) 12th grade = 66 students
   e) other (explain) = 1 adult

2. ESTIMATE your grade point average for the past three years.
   a) "A" student = 63 students
   b) "B" student = 90 students
   c) "C" student = 29 students
   d) "D" student = 1 student

3. If you had a choice between enrolling in a satellite course or taking the same course in a regular classroom, which would you choose?
   a) regular class = 134 responses
   b) satellite class = 50 responses

4. Are you taking this course for Advanced Placement?
   a) yes = 135 responses
   b) no = 56 responses

5. How many satellite courses are you enrolled in? Avg. = 1 course

Answer questions 6, 7, 8, 9 and 10 for your most enjoyable TV course. (If you are enrolled in only one course, then answer for that course.)

6. ESTIMATE the number of times during the last week that you contacted your "satellite teacher". Avg. = 7.32 times

7. ESTIMATE the number of times during the last week that your "satellite teacher" contacted you. Avg. = 3.41 times

8. Is this class an elective or is it required?
   a) elective = 168 responses
   b) required = 21 responses

9. How many students are in the class at your site? Avg. = 8 students

10. ESTIMATE the number of students in the entire class (including all sites). Avg. = 165 students

Answer the questions below, based on the following five point scale:

Don't Know	Strongly Disagree				Strongly Agree
0	1	2	3	4	5

11. Satellite courses are more difficult than regular classes taught in school. Avg. = 3.49

12. I could make a better grade if the course was taught in a regular setting. Avg. = 3.44

13. I've gotten to know the students in my satellite course as well as the students in my regular classes, even though my satellite classmates are farther away. Avg. = 1.64

14. I work more closely with the students in my on site satellite class than with students in my regular classes. Avg. = 2.9

15. My satellite teacher is as friendly to me as most regular teachers in my school. Avg. = 3.81

16. I can easily contact the satellite teacher to ask questions or make comments if I want to. Avg. = 3.75

17. The satellite course(s) I am taking will help me get into college. Avg. = 3.36

18. I have to work harder in my satellite course than I do during a regular class. Avg. = 3.65

19. Only certain students at my school get to take a satellite course. Avg. = 2.5

20. Homework assignments are returned more slowly in satellite courses than they are in most of my regular classes. Avg. = 3.69

21. What are the three best things about a satellite course?

    1. Can receive college credit and prep. = 44 responses
    2. Ability to expand the curriculum. = 38 responses
    3. Ability to interact with students at other schools. = 32 responses

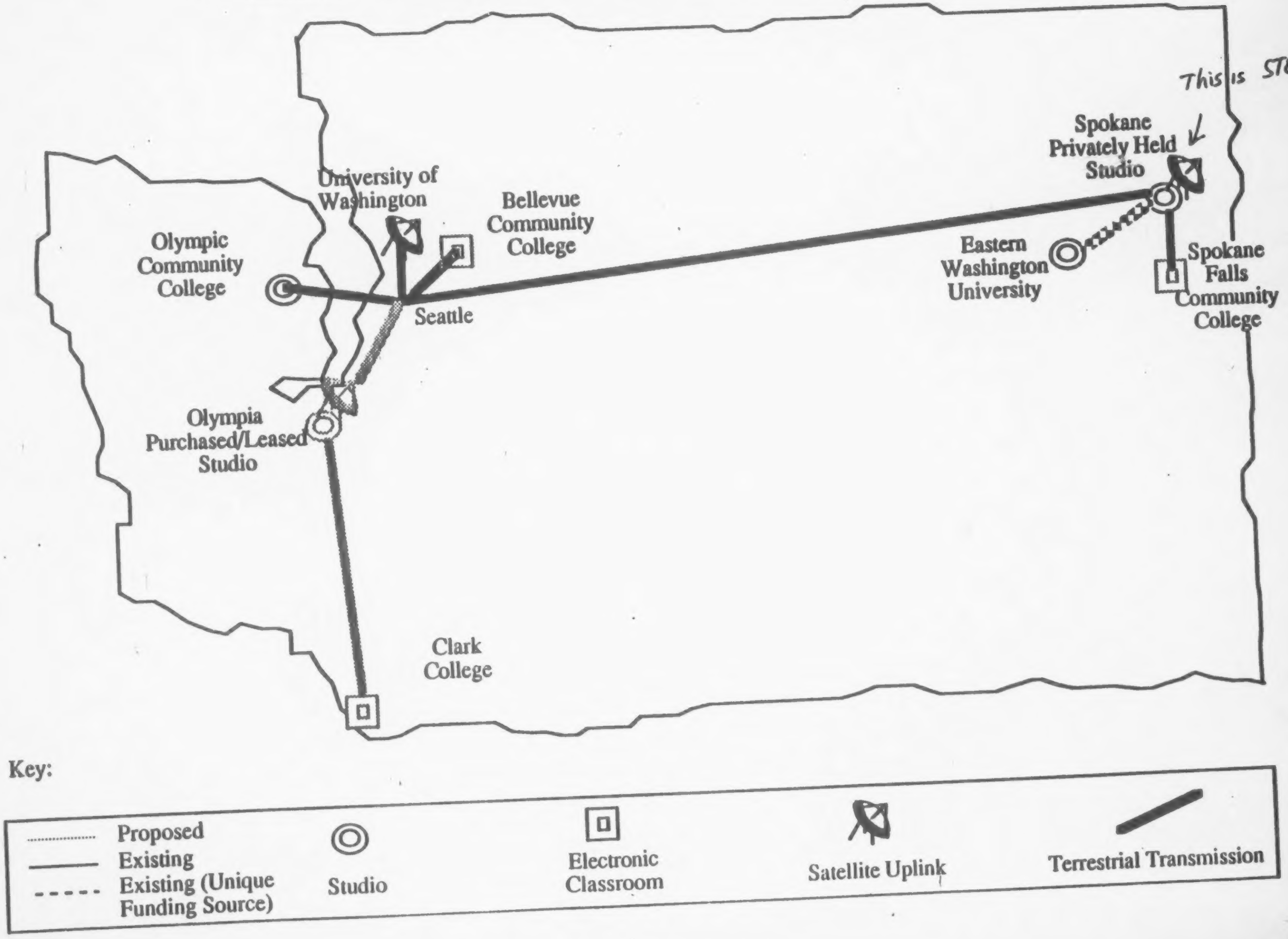
22. What are the three worst things about a satellite course?

    1. Pacing is too slow or too fast. = 63 responses
    2. Minor technical difficulties. = 63 responses
    3. Difficult to ask questions. = 47 responses

APPENDIX 1

Proposed sites for studio production and uplinking for statewide satellite network.

Sharing Video Telecommunications Resources
Terrestrial Transmission Paths and Uplink Sites Recommendations 1990-91


University of Washington
Bellevue Community College
Olympic Community College
Seattle
Olympia Purchased/Leased Studio
Clark College
Spokane Privately Held Studio
Eastern Washington University
Spokane Falls Community College
Key:
Proposed
Existing
Existing (Unique Funding Source)
Studio
Electronic Classroom
Satellite Uplink
Terrestrial Transmission

This is STEP

Appendix G

Information contained in this case study was obtained via printed materials supplied by STEP administrators at Education Service District 101 in Spokane, Washington; from survey data mailed to 55 of the participating school districts subscribing to STEP classes and returned from them in February, March, and April 1989; and from on-site interviews and class observations with the following individuals on the dates listed below:

March 6, 1989

Ted Roscher
Instructional Division Administrator
and STEP Director
East 4022 Broadway
Spokane, Washington 99202

Penelope Cooper
STEP Principal & Manager
East 4022 Broadway
Spokane, Washington 99202

Jason Vingelen
Vice President and General Manager
RXL Communications
East 4022 Broadway
Spokane, Washington

STEP Satellite Teachers
East 4022 Broadway
Spokane, Washington
Penelope Cooper -- Advanced Senior English
Eusebisa Anderson -- Spanish I
Debra Wilson -- Pre-calculus
Atsumi McCauley -- Japanese
Suzanne Jespersen -- Spanish II

March 7

Mike Sowder
Principal
Riverside High School
Riverside, Washington

Kathy Hansen
Classroom Coordinator
Riverside High School
Riverside, Washington

Students in Advanced Senior English Class (13 students)
Riverside High School
Riverside, Washington

Steve Waunch
Principal
Selkirk Consolidated School District
Metaline Falls, Washington

Classroom Coordinator
Selkirk Consolidated School District
Metaline Falls, Washington

Students in Spanish I Class
Selkirk Consolidated School District
Metaline Falls, Washington

Revised Copy
May 1989

REGION 8 -- WESTERN REGION EDUCATIONAL CENTER: A REGIONAL APPLICATION OF THE TI-IN SATELLITE NETWORK IN WESTERN NORTH CAROLINA

Introduction

In January 1988, the North Carolina State Department of Public Instruction (SDPI) and the TI-IN Network of San Antonio, Texas entered a contractual agreement to form a statewide satellite network to provide high school instruction and staff development throughout the state. A total of 153 receive sites were established. The action between the SDPI and TI-IN represents the largest such statewide initiative, to date, in the United States and the first such partnership between a state office of education and a private corporation (Tinsley, Brumback, and De Grand, 1989). Administrators, students, and teachers at the 11 school districts in western North Carolina's Region 8 Western Region Educational Center (WREC) reported in this study provide an example of how the network is being used.

This report outlines how the statewide network started, provides a brief description of the TI-IN operation, examines the North Carolina partnership with TI-IN, and examines how the network serves educators and students in the Region 8 educational service center in western North Carolina.

Development of North Carolina's Statewide Network

The SDPI's Distance Learning by Satellite Program is a state funded effort that established satellite earth stations in the 54 smallest and most rural high schools in North Carolina. The program also provided for the placement of one downlink dish in each county in the state for staff development purposes. The program is a partnership with the State Department of Public Instruction and the TI-IN Network. A total of 153 downlink dishes were installed in North Carolina as a part of the Distance Learning by Satellite Program funded for $3,000,000 by the North Carolina legislature.

Personnel at the State Department of Public Instruction were interested in locating an existing provider/vendor that offered extensive staff development training and a broad array of high school credit courses that could be used to augment the limited number of curricular offering in many of the state's smaller high schools. According to Elsie Brumback, Assistant Superintendent SDPI (TI-IN Network News, 1988, p. 1), "North Carolina has many small, rural high schools which, because of low enrollment and remote locations, cannot offer all the courses mandated by our state's Basic Education Plan. North Carolina has desperately needed an alternative method to bring students the kind of education envisioned by developers of the [basic education] plan." Interest in making quality staff development training more accessible to all educational employees around the state was another factor motivating the Department's interest in distance education.

Prior to introduction and passage of the Distance Learning Program bill by the General Assembly, personnel in the State Department of Public Instruction's Educational Media and Technology Services division had investigated several pilot distance learning programs across the country including the Arts and Sciences Teleconferencing Service at Oklahoma State University, the Utah Accelerated Learning of Spanish, Learn Alaska, and TI-IN Network programs (TI-IN Network News, 1988). They conducted a survey among principals of the state's smallest rural high schools to determine what the greatest curricular needs were in high schools of 450 students or less.

During the 1985-86 school year, a distance learning by satellite pilot project using the TI-IN Network was undertaken at three downlink sites located in Currituck County -- Roanoke, Rapids City, and at one site in Graham County with funds from a Federal Title II grant through the Education for Economic Security Act. The six week project received six separate one hour broadcasts each week and was focused on staff development training on how to incorporate microcomputers in the classroom. Over ninety percent of the teachers participating in the pilot program reported that satellite delivery of instruction was a good method for offering inservice training. (North Carolina Department of Public Instruction, 1988; TI-IN Network News, 1988; U.S. Congress, Office of Technology Assessment, 1988). The successful pilot project suggested to SDPI officials that satellite technology was an appropriate distance education medium that could be used to provide (1) increased high school course offerings for low enrollment classes in small schools, (2) staff development training for updating skills of administrators, teachers, and support staff on an on-going basis; and (3) increased equity in educational opportunities and services. Following the successful pilot project, Department of Public Instruction personnel provided information to selected state legislators about the potential of satellite delivered instruction as a viable option to help provide increased course offerings in smaller high schools and as a means to increase opportunities for staff development training. Key legislators expressed interest in the concept of satellite delivery to reach students and teachers in isolated setting. Work was then begun to present a bill before the General Assembly to set aside state funds to establish a statewide satellite network.

In October 1987, a six member investigating team, made up mostly of administrators from SDPI, traveled to San Antonio to learn more about the TI-IN program. The team returned from San Antonio recommending that efforts be made to work with TI-IN to contract education programming and to help in establishing North Carolina's own statewide network. TI-IN was chosen because of the variety of courses offered for high school credit and for the broad assortment of staff development programs available. Elsie Brumback added that over the years (TI-IN Network News, 1988, p. 7) "We [SDPI] have worked with a variety of distance learning media -- electronic blackboards, computer networking, non-interactive television, etc., and nothing comes closer than TI-IN to having a teacher in the classroom. . . I have been in the media and technology area for 30 years and have become more excited about this medium [satellite] than any other."

In the 1987 General Assembly of the North Carolina legislature, Representative Jeff Enloe (Democrat, Macon County) and Senator Marc Basnight (Democrat, Dare County) introduced the Distance Learning by Satellite Program Bill. The bill's purpose was to provide state funding to establish satellite earth stations in each of the 100 counties of the state and to each high school with an enrollment of 450 students or less. Initial intent of the legislation was to use the downlink dishes to receive programming for teacher inservice training and staff development in critical teaching areas identified by local school administrators and for the state's teacher career ladder program. The legislation was also designed to provide high school courses in the state's smaller high schools required to meet the mandates of the state's Basic Education Plan.

Passage of the bill provided funds in the amount of $1,998,150 for fiscal year 1987-88 to be used for the purchase of satellite receiver equipment and hardware, and $1,030,000 for fiscal year 1988-89. Of the monies appropriated for the 1988-89 school year, $95,150 was to be used to provide a telecommunication specialist, a secretary, and staff support in the North Carolina State Department of Public Instruction. The remaining funds for 1988-89 ($934,850) were earmarked for purchase of satellite delivered educational programming in the form of both high school credit courses -- intended to increase curricula offerings in the state's smallest high schools -- and for staff development. In the end, 52 of the smallest high schools in the state (those with enrollments of 450 students or less, grades 9-12) were slated to receive satellite receive dishes and equipment for high school programming. A total of 100 sites were selected by county and city superintendents as receive sites for staff development programming and one dish was placed at the SDPI. Eight of the 52 high schools were also designated to serve as receive sites for staff development training. In total, 153 sites were identified to receive downlink dishes and equipment to be financed by first year funds passed by the General Assembly (Brumback, 1987).

The TI-IN Network, San Antonio, Texas

The TI-IN Network Incorporated is a privately supported and managed, for-profit vendor of satellite programming to schools. TI-IN is the largest interactive satellite systems for K-12 credit programming, teacher inservice training staff development, and student enrichment viewing in the United States. In the Fall of 1985, TI-IN became the first private vendor in the United States to broadcast live, one-way TV courses via satellite to subscribing high schools. At the end of its first year of operation, TI-IN was broadcasting 14 accredited high school courses to over 50 high schools scattered throughout Texas, California, and Arkansas. (Barker, 1987a). One year later, 17 different high school courses were being received by over 150 downlink sites in 25 different states (Rash, 1988). In March 1989, TI-IN broadcasts were received by over 750 subscribing schools in

29 states. The number of students currently enrolled in TI-IN courses approximates 4000. Within the next year, TI-IN administrators anticipate that some 6000 students will be enrolled in satellite courses and that the number of downlink sites will exceed 800 (Babic, 1989). In 1988 TI-IN was one of four successful applicants for funds from the Federal Star Schools' program. The amount awarded for 1988-89 was $5.6 million.

With federal funding for Star Schools, TI-IN has entered into a multi-state, nine partner educational network that has significantly expanded program options to subscribing schools. TI-IN's partners are the University of Alabama at Tuscalossa, California State University at Chico, Education Service Center, Region 20 in San Antonio, the Illinois State Board of Education, Mississippi State University at Starksville, the North Carolina Department of Public Instruction, Texas Education Agency, and Western Illinois University at Macomb.

A Description of TI-IN Operations and Programming

Live TV broadcasts are beamed nationwide from TI-IN studios located at San Antonio via a Ku up-link antenna to the Spacenet II satellite. TI-IN broadcasts four channels of programming on two transponders. When the signal from the uplink is received at the transponder, it is altered to a different frequency, amplified, and then rebroadcast back to earth stations (downlinks) at receive site locations. Since only two transponders are used for four channel, two channels share one transponder. Therefore, audio and video signals from each TI-IN program are rebroadcast back to earth in a one-half transponder format. TI-IN transponders on Spacenet II operate in a Ku band frequency. According to Bart Batson (1987), TI-IN's technical engineer, "[Ku] is the state-of-the-art for satellite transmission. Satellites operating on the older C-band share a range of frequencies with terrestrial microwaves and include many cable television satellites. The Ku band is a higher range of frequencies that offers clearer reception."

Satellite technology permits one-way transmission of voice, data, and full-motion video. Audio talk-back by participants at the receiver site locations is over regular telephone lines. By picking up a cordless talkback unit, which is a modified cordless telephone, students at subscribing schools can call in questions on a toll-free telephone line, and hear their instructors' answers on the air. Each of TI-IN's three studios have four toll free (800 numbers) telephones lines wired in. The telephone numbers are encoded in the video signal transmitted from the studio over the satellite. TI-IN's custom made audio-video unit in each receive site classroom stores the encoded phone numbers. When a telephone call is initiated from the remote site classroom, the correct studio is automatically dialed. If the telephone line is open, it requires 15-20 seconds for the connection to be made. Calls are accepted in a first-come-first-serve basis.

With the interactive technology, students can both see and hear their instructor over the classroom television and can hear comments from students who are on-line talking to the TI-IN teacher. Students can talk directly to their TV teacher to ask questions or make comments if they are on-line by telephone. The student-to-student interaction between different sites, however, is considerably limited. If other students are on-line with the studio via one of the other phone lines, then students at different sites can talk to one other directly. Otherwise, live student-to-student interaction between sites is not possible. The teacher cannot see students nor can students at different sites see on another. A "call display unit" in the teachers' studios does identify the location from which each outside call originates.

TI-IN provides a complete turn-key system. For example, each remote site is equipped with a TI-IN Network audio/video unit (AVU). A black metal cabinet mounted on wheels, the AVU is between 4-5 feet high and narrow enough to fit through a standard sized door. On top of the cabinet is a 20 inch color TV monitor which is used to display TI-IN programs. Inside the cabinet is a video cassette recorder. The cabinet also contains a signal de-scrambler so that the TI-IN signal can be received properly. Special cordless hand-held telephones are located in the AVU cabinet and are used by students to call the instructor. The telephones' dial pads have been specially altered. Students simply depress what amounts to an "on-off" button which then automatically dials one of the studio's toll-free telephone numbers. Finally, the AVU cabinet houses a printer, used to print out class assignments, tests, etc. that are sent directly to the school via satellite. A separate door on the AVU cart can be locked to maintain the security of the printer. All pieces of equipment in the audio/video unit are specially modified. Proprietary equipment is leased by the subscriber as part of their annual subscription feel. Consequently, TI-IN technical personnel are fully aware of the equipment specifications at each remote site and can upgrade equipment when it is deemed necessary.

The TI-IN uplink antenna and broadcast studios are located at the Texas Education Agency Region 20 Education Service Center in San Antonio. TI-IN leases office space and studio time from Region 20. Staff development courses are broadcast from a large studio that has two wall mounted cameras, one ceiling mounted camera to serve as an overhead projector, and three floor cameras operated by technicians. High school classes originate from three teaching studios simultaneously, broadcast on three separate channels. All cameras and equipment in the high school teaching studios are controlled by the instructor. They have the capability to preload slides, videotapes, and superimpose printing across the bottom of the TV screen. Each instructor is able to view a small monitor, off camera, which allows viewing of how they look on air, as well as their videotapes, slides, transparencies, etc. No students are in the studios during high school class broadcasts. The teachers teach to a camera.

TI-IN Operating Policies

High school credit classes are broadcast a total of 175 instructional days per school year. Courses are received on four different channels. Class instruction is 50 minutes in length per class. Instructional broadcasts are scheduled according to the Central time zone. TI-IN has established a ceiling of 200 students in any one class. High school classes begin the first of September and end the last full week in May. Instruction has not been broadcast on the following national holidays during the school year: Labor Day, Thanksgiving, two weeks during Christmas and New Years, and Easter. Inasmuch as spring break vacation, unlike the break at Christmas and New Years, varies so much from district to district, TI-IN classes continue throughout spring with no break. Individual districts are responsible to videotape record their TI-IN classes during their respective spring breaks. Upon return from spring break, students are to view one make-up class per day as well as keep up with the current live broadcasts.

Weekly lesson plans with accompanying handouts and exams are either mailed to the remote site classroom facilitator through the U.S. Postal Service or sent by electronic mail directly to the printer located in each TI-IN equipment cart. Each lesson plan is for a one week period. Grade reports from TI-IN are issued for each course every six or nine weeks, depending on local school district policy.

In North Carolina each local school district is responsible to assign staff members to the following roles: district coordinator, site manager, equipment manager, and classroom facilitator. The district coordinator acts as the TI-IN coordinator for all receive sites within the district. The district coordinator also appoints district personnel to serve as the site manager and classroom facilitator(s). The site manager is usually the principal or assistant principal and acts as the local TI-IN manager and contact person between his/her site and TI-IN. The equipment manager is usually a staff member at the school who is assigned to check TI-IN equipment and report any problems directly to TI-IN. The classroom facilitator is assigned to monitor high school credit courses and to work with TI-IN TV instructors on matters which deal directly with the course. The classroom facilitator is responsible for recording official attendance each day, reporting discipline problems, proctoring exams, and other appropriate duties to assist the TI-IN teacher. Quarterly training sessions are held over the network for classroom facilitators.

TI-IN Programming

To all its subscribing schools, TI-IN offers over 20 high school credit offerings, more than 400 hours of yearly staff development programming, more than 40 student enrichment courses, and a variety of special programs. Satellite broadcasts have provided students an opportunity to interact with professionals ranging from songwriters and authors to scientists and college professors. Among TI-IN presenters have been Olympic gymnast coach Bela Karolyi, advice columnist Heloise, and others.

High school course offering by category include: foreign languages -- French I, II, III; German I, II, Japanese I, Latin I, II, and Spanish I, II, III; humanities and social sciences -- Art History and Appreciation, Creative/Imaginative Writing, Psychology, and Sociology; science -- Astronomy, Marine Science, and Physics I; mathematics and computer science -- Calculus Honors, Computer Science I, Elementary Analysis, Probability and Statistics Honors, and Trigonometry.

Region 8 -- Western Region Educational Center's Use of TI-IN

Region 8 - Western Region Educational Center (WREC) located in the Great Smokey Mountains of western North Carolina has 11 small, rural school districts in its 16 county service area that belong to the North Carolina State Department of Public Instruction's Distance Learning by Satellite Program. Some of these schools are very small in terms of student enrollment and are geographically isolated from the state's major urban centers of Charlotte, Raleigh, and Winston-Salem. The involvement of these 11 schools in satellite delivered courses is part of the North Carolina State Department of Public Instruction's statewide Distance Learning by Satellite Network.

WREC services a total of 197 schools and a regional student population of approximately 94,000. The WREC unit is one of eight educational service center units in the state which act as liaisons between the State Department of Public Instruction at Raleigh and the local schools in each region's service area. Each of the state's eight educational centers offers administrative, financial and instructional services to public schools in their areas.

The Partnership Arrangement between TI-IN, SDPI, and Region 8

The major partnerships are between the North Carolina State Department of Public Instruction, the TI-IN Network, and subscribing schools in Region 8 - WREC. TI-IN provides all equipment, programming, and technical support.

The North Carolina SDPI oversees the state's Distance Learning by Satellite Network, provides state sponsored satellite delivered inservice training, conducts program evaluations, authorizes issuance of credit for courses, and coordinates closely with TI-IN to communicate needs and concerns as they relate to North Carolina.

In accordance with TI-IN policies, Region 8 - WREC identifies personnel at the receive sites to serve as a district coordinator, site manager, equipment manager, and classroom facilitator(s).

Costs

For the North Carolina statewide network, capital equipment items were purchased in volume by the state.

Estimated costs on a per site basis were: 3.4 meter downlink dish with low noise converter, $2000; integrated audio video unit with the TV monitor, video tape recorder, printer, etc., $2400; and equipment installation, $3300 - $5800. Exact installation costs vary due to differences in terrain and distances between sites which effect costs in handling, shipping, and travel. Appendix A provides a breakdown of costs to receive TI-IN programming in North Carolina.

The SDPI maintains title, at each of the 153 sites, on the Ku band antenna, low noise block down converter, mount and back support structure for the dish, the classroom TV monitor,the 1/2'' VHS videocassette recorder, the dot-matrix printer, and the audio video equipment cabinet.

TI-IN leases to each site the Ku band receiver, the addressable controller/decoder, the talkback unit including base, handset and order-wire phone, and the multi-function interface unit. All local site equipment items are standardized across TI-IN's national network. The leased hardware is sophisticated electronic equipment that can be upgraded as TI-IN keeps pace with improvements and changes in technology.

As was TI-IN policy at the time, all downlink dishes in North Carolina are equipped for Ku band reception only; they are not able to receive C band signals. Furthermore, each of the dishes are fixed -- that is, they cannot be steered or rotated to pick up signals from another satellite unless they are upgraded.

In addition to equipment, the annual recurring subscription fee for North Carolina schools is $4750 each (the nationwide subscription fee is $5250). This allows schools to receive TI-IN enrichment and non-credit programming.

High school credit courses, staff development training, and college credit courses have additional fees. The fee for high school courses is $240 per student per course per semester. An additional $50 fee is assessed for each student enrolled in foreign language classes and for selected science classes, to offset additional instructional support (eg. audio tapes and/or lab kits).

The costs for 400 plus hours of staff development programming is determined by a district's average daily attendance (ADA). For districts of less than 2000 ADA, the fee is $2400; for 2001 to 8000 ADA, the fee is $4600; for 8001 to 12,000 ADA, the fee is $8800; and with more than 12,000 ADA, the fee is $12,000.

For the 52 smallest rural high schools, North Carolina state monies cover the annual subscription fee, staff development programming fee, and yearly high school enrollment fees for a maximum of 20 students at each school. If more than 20 high school students enroll in TI-IN courses, the local school covers additional costs. State monies have been approved from the governor's continuation budget to carry on payment for the annual subscription fee, high school programming fee, and staff development fees as presently established for the 1989-1990 school year. New districts who join the network are responsible to locate funds from other sources to pay for equipment and subscription charges.

Evaluative Data

Formal evaluations of TI-IN's nationwide operation have been overall positive. During TI-IN's first year of programming, 159 students scattered among 30 schools in three states were contacted to identify student perceived strengths and weaknesses (Barker, 1987b). In descending order of frequency reported, the major strengths of TI-IN high school classes were: the variety of classes available, the positive personality of the teacher(s), and the fact that the instruction was interesting. According to students, the least liked aspects were: too much homework was required and it was too difficult, communication over the telephone when on-line with the TV teachers made hearing difficult, it was often hard to "get through" to the TV teacher by telephone during the lesson broadcast, and the contact between the TV teacher and classmates in other locations seemed too impersonal.

Another independent survey of user attitudes regarding TI-IN courses was conducted by Greece Central School District in upstate New York in 1987 (TI-IN Network News, 1987). From the Greece study, the major strengths were: TI-IN's commitment to education, quality of technical operations provided, wide range of course offerings, and the interactive capability of the system.

Over 1100 high school students were enrolled in the North Carolina's statewide Distance Learning by Satellite Program in September 1988. The State Department of Public Instruction has been collecting evaluative data from students and administrators participating on its statewide network, but data had not yet been fully compiled at the time of this writing.

During TI-IN classroom observations conducted as a part of this OTA study, the attitudes of students and administrators seemed to be mixed. One principal stated, "In a small school like ours, students are used to a great deal of individual attention. We had to adjust our attitude on this for satellite classes." Another reported, "I like it for providing the opportunity to offer courses such as marine biology. We'd never be able to offer this course otherwise."

Although each of the principals reported that they were pleased to have TI-IN classes in their schools, all but one commented that if the State Department of Public Instruction did not provide funding to pay for subscription and programming fees, the local school would discontinue the program. For example, one principal stated, "This is something which the state has provided and I'll use it. But, this is not something that I would go out and purchase for our own school from local monies."

Student interaction over the system and scheduling seemed to be the major concerns expressed by students and administrators. The offering of TI-IN classes in one school conflicted by as much as 30 minutes with their schedules -- that is, students missed 30 minutes of the TI-IN class each day, and the principal at that school stated "If the bell schedule conflict remains, we probably will not offer more TI-IN courses in the future." The bell schedule was not as serious of a problem in other schools visited (for most the schedule was off by 5-10 minutes), but it was mentioned as a problem at each site. But the issue of scheduling went beyond the matter of bell scheduling. For example, the scheduling of grades at one school was a matter of serious concern. The school's grade reporting system did not coordinate with any of TI-IN's grade report schedules. For one school visited, this created some real problems in terms of making a decision on the school valedictorian. The issue became more compounded because parents were concerned about the possible impact their daughter's TI-IN grade would have on a university scholarship she was competing for.

In regards to student interaction with their TI-IN teacher, most stated during interviews that they liked the teacher and occasionally called in after class to ask questions. During the lesson presentation, several reported that it was often very difficult to get an open line. One student said that he has often called 4-5 times before successfully getting through to the teacher. Others stated that when 3-4 other sites are on-line, it often becomes very difficult to hear because of a loud echo over the TV. When this happens, students at virtually every school visited said that they really don't pay much attention to what is happening on the TV screen. One administrator sitting with a group of TI-IN students said, "I feel the TI-IN teachers overall are very good instructors, but when they get 2-3 schools on at one time, then there is a lot of drift in student attention at our school. The students at our site then feel impersonal and are not as attentive." At each site, however, students indicated that their TI-IN teacher had designated one day during class each week that their school was to call into the studio to participate during the broadcast lesson.

Survey Data

A total of 117 questionnaires were returned. These included 7 administrators, 13 tele-teachers, 29 regular classroom teachers (teachers not directly involved with the tele-system), 7 facilitators and 74 students (see Appendix B for a detailed summation of survey responses).

Responses From Administrators

The administrators who responded to the questionnaires indicated that the average enrollment of their schools was 430 students. An average of 14 students at each site were taking one or more tele-courses. After spending an average of 5.4 hours the previous semester observing the tele-courses, five of the administrators agreed that the quality of the tele-teaching was at least as good as the quality of the regular teaching.

Most of the administrators felt that the parents and the school boards in their districts were supportive of the use of tele-teaching. On a scale of "1" equals "poor" to "5" equals "excellent", the administrators felt that the overall benefit of the tele-courses to their schools' instructional programs was a 3.71 and that the cost effectiveness of the tele-courses in terms of student learning was a 2.83. When asked to list strong points of the tele-learning system, six of the administrators listed expanded curriculum offerings. Two said that the ability to interact with other schools was a benefit. When asked to list weak points of the tele-learning system, four administrators expressed concern over schedule coordination. Three others indicated that the system required the hiring of an aid.

Responses From TI-IN Teachers

The TI-IN teachers felt that the number of students in their audiographics classes was within manageable limits for effective instruction. They spent an average of an hour and fifteen minutes in preparing a daily lesson plan for a tele-course and estimated that it took fourteen days for homework to be graded and returned to the students. None of the TI-IN teachers felt that tele-teaching technologies would replace regular classroom teachers. They reported that students in their classes were assigned as much homework as students in regular classes and that cheating on tests and assignments was infrequent. The TI-IN teachers said that a conscientious facilitator was essential for a successful tele-course and that their students did as well in a tele-course as they would in a regular course.

When asked to describe how a tele-class was different from a regular class, ten of the TI-IN teachers said that the

TI-IN classes were more task oriented and had fewer distractions. Six said that, since there was no visual feedback from the students, they had to rely on a different set of ques for student feedback. Five said that the system had more potential for multi-media presentations and cross cultural teaching.

Responses From Regular Teachers

All of the teachers who responded to the questionnaire were aware that distance education courses were being taught in their schools. On a five point scale where "1" was "poor" and "5" was "excellent", the regular teachers rated the quality of instruction provided the tele-students at 3.94. Eleven of the teachers had received inservice training over the system and, using the same five point scale, rated the experience at 4.30. The regular teachers did not feel that students had to work harder during a tele-course than in a regular class, nor did they feel that offering courses via tele-teaching would significantly reduce job opportunities for regular classroom teachers.

When asked to list the strong points of the tele-courses, 79 percent of the regular teachers felt that the ability to expand the schools' curriculum offerings was important. Twenty eight percent said that the tele-courses offered the students an opportunity to interact with students from other schools. As weak points, 38 percent of the regular teachers mentioned problems with scheduling. Twenty four percent felt that there was not enough interaction between the tele-students and the tele-teachers.

Responses From Facilitators

Of the seven facilitators who responded, one was certified to teach the subject being offered. They had an average of nineteen hours of training for their position. They felt that tele-courses were no more difficult for the students than traditional courses. The facilitators said that cheating on tests or assignments occurred very infrequently in the tele-courses.

When asked about the system's strong points, 71 percent of the facilitators said that it expanded the school districts' curriculum offerings. Twenty nine percent felt that the quality of the tele-teachers was a strong point. Twenty nine percent also said that the ability to tape the tele-courses for viewing at a later time was an advantage.

Responses From Students

If given a choice between taking a regular class or taking a tele-course, 27 of the 74 students said that they would take a tele-course. The students estimated that they asked a question or made a comment in the tele-course one or two times per week, and that the tele-teacher called on each student less than once per week. About half of the students reported that they could easily contact the tele-teacher. When asked to list the system's strong points, 28 percent of the students said that the system's ability to expand the curriculum was important. Twenty six percent said that the tele-courses were a different way of learning. As for the system's weak points, 39 percent of the students said that it was difficult to get personalized attention. Thirty two percent claimed that it was hard to ask questions.

Plans for Future Development

The North Carolina State Department of Public Instruction is a consortium member of the TI-IN United Star Schools Network. Seventeen North Carolina sites have been added to the statewide network as a result of Star School funding. The state department's role in terms of programming has also expanded. For the 1989-90 school year, the SDPI provided one hour of programming per week for the statewide network. Some of the titles have been: chapter one update, religion in the curriculum, assessing 1st and 2nd graders, state board of education update, public school finance, etc. For 1990-91, the SDPI is developing an 18 hour methods course for teaching foreign languages in the elementary grades. In cooperation with TI-IN, the SDPI will also originate selected staff development programs intended for broadcast over the entire

TI-IN network. All programs originating from the North Carolina SDPI are uplinked from the State Agency for Public Telecommunications located in Raleigh.

According to SDPI personnel, the future direction of the North Carolina statewide network and TI-IN will be to continue to provide ongoing programming and expand in terms of more programming for inservice training that is delivered by North Carolina state department personnel. State educational leaders also hope to see the network grow in the number of member schools.

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Appendix A

Estimate of Costs to Receive Tele-courses Via TI-IN Satellite Network From the Perspective of North Carolina's Region 8 Western Region Educational Center Member Schools

Equipment and installation:	10,350.00
Subscription fee:	4,750.00 yearly fee
Tuition:	240.00-290.00 per student per course/semester

Personnel: Site Coordinator
Site Manager
Facilitator for each classroom

Note: All equipment has been provided to the local schools through money from the state legislature. State money is also used to pay the annual subscription fee and tuition costs for up to 20 students. Since print materials are sent by mail rather than fax, there are additional postage expenses.

Appendix B

Responses From TI-IN Questionnaires

Administrator Questionnaire
(7 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. ESTIMATE the total enrollment of your school. Avg. = 430 students

2. ESTIMATE how many students in your school are enrolled in satellite courses. Avg. = 14 students

3. Describe the academic level of students participating in satellite courses.
   a) mostly "A" and "B" students = 7 students
   b) mostly "C" students = 0 students
   c) mostly "D" and "F" students = 0 students
   d) all types of students = 0 students

4. How would you describe the classroom manager/facilitator of tele-courses?
   a) certified teacher in subject area being taught = 0 facilitators
   b) certified teacher, but not in subject area being taught = 1 facilitator
   c) teacher aide = 5 facilitators
   d) volunteer = 0 facilitators
   e) other = 0 facilitators

5. ESTIMATE the number of hours you spent last semester observing the satellite course(s) in your school. Avg. = 5.4 hours

Based on your experience with students being taught via satellite, answer the questions below, using the following five point scale:

	Strongly Disagree 1	2	3	4	Strongly Agree 5
6. The quality of the satellite teaching in our school is as good as the quality of our regular teaching.	Avg. = 3				

7. Regular classroom teachers in our school feel their jobs are threatened by "distance education" instruction.	Avg. = 2
8. The teacher union (or state teachers' organization) in our state is supportive of the use of satellite teaching in our school.	Avg. = 3.14
9. Parents in our district are supportive of the use of satellite teaching in our school.	Avg. = 3.57
10. Our school board is supportive of the use of satellite teaching in our school.	Avg. = 4

Rate each of the following items on the basis of "Poor" to "Excellent":

	Don't Know 0 · Poor 1 · 2 · 3 · 4 · Excellent 5
11. Attitude of students toward satellite courses.	Avg. = 3
12. Attitude of students toward satellite teachers.	Avg. = 3.14
13. Quality of student learning achieved via satellite learning.	Avg. = 3.14
14. Overall attitude of teachers in your school regarding quality of courses taught via satellite teaching.	Avg. = 3.17
15. Use of audio-visual aids in satellite courses (e.g. pictures, overhead transparencies, films, videos, etc.).	Avg. = 3
16. Benefit of satellite courses to your school's instructional program.	Avg. = 3.71
17. Cost effectiveness of satellite courses -- that is, has the learning achieved by students been worth the money?	Avg. = 2.83

18. Do you formally evaluate the satellite teachers in the same way you evaluate the regular teachers?
    a) yes = 1 formal evaluation
    b) no = 6 formal evaluation

19. What are the two or three major benefit(s) of satellite courses for your school?

    1. Ability to expand curriculum = 6 responses
    2. Ability to interact with other schools = 2 responses
    3. Opportunity to use innovative technology = 2 responses

20. What, if any, have been the major problems you've encountered?

    1. Schedule conflicts = 4 responses
    2. Requires a well qualified aide = 3 responses
    3. No control over the teachers and poor student performance = 2 responses

Tele-teacher Questionnaire
(13 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. How many years have you taught school? Avg. = 11 years

2. How many years have you been teaching TV courses? Avg. = 2.3 years

3. Do you teach any regular classes?
   a) yes = 0 responses
   b) no = 13 responses

4. What is your highest college degree? Bachelors = 4
   Masters = 8

5. Did you receive training for your TV teaching assignment?
   a) yes = 3 responses
   b) no = 10 responses

6. How many satellite courses do you teach a day? Avg. = 1.6 courses

7. How many students are enrolled in your satellite course(s)?
   Avg. = 135 students

8. How many sites are there in your satellite course(s)?
   Avg. = 46 sites

9. ESTIMATE what you think is the ideal class size (all sites combined) for a distance education class.
   Avg. = 140 students

10. At what point do you think class size (all sites combined) becomes too large?
    Avg. = 175 students

11. ESTIMATE how long it takes, on the average, to prepare a daily lesson for your satellite course.
    Avg. = 75 minutes

12. ESTIMATE how many days it takes for students in your satellite course to have their homework assignments/tests graded and returned to them.
    Avg. = 14 days

13. For a typical satellite course, ESTIMATE the number of telephone calls you receive from parents of students during an average semester.
Avg. = 1.6 calls

14. For a typical satellite course ESTIMATE the number of telephone calls you initiate to parents of students during an average semester.
Avg. = 0.7 calls

15. Is your satellite teaching formally evaluated by school principals (or other administrators) at distant site locations?
    a) yes = 3 responses
    b) no = 9 responses

16. Is your satellite course(s) mostly geared for
    a) remedial students? = 0 students
    b) average students? = 4 students
    c) advanced students? = 9 students
    d) mixture of all of these = 3 students

17. Do you receive a higher salary for teaching satellite courses than you would if you taught in a regular classroom?
    a) yes = 3 responses
    b) no = 8 responses

18. Do you have a reduced teaching load, as compared to a regular teacher, because you are a satellite teacher?
    a) yes = 3 responses
    b) no = 9 responses

19. What are the THREE most important ways that satellite teaching is different from regular classroom teaching?

    1. It is more task oriented with fewer distractions. = 10 responses
    2. We must rely on a different set of student feedback cues. = 6 responses
    3. There is greater potential for multi-media and cross-cultural teaching. = 5 responses

Answer the questions below, based on the following five point scale:

Strongly Disagree — Strongly Agree
1 2 3 4 5

20. Satellite teaching technologies will replace regular classroom teachers. Avg. = 1.08

21. Preparing lesson materials for delivery via satellite teaching technologies is much more time consuming than preparing lessons for regular teaching. Avg. = 4.31

22. Students in my satellite course(s) are assigned as much homework as students in regular classes. Avg. = 4.69

23. Student cheating on tests or assignments occurs very infrequently in my satellite course(s). Avg. = 3.69

24. A conscientious, well trained facilitator must be present for successful satellite teaching. Avg. = 4.92

25. My students do as well over satellite as they would in the traditional classroom setting. Avg. = 4.38

Regular Teacher Questionnaire
*(29 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you aware that "distance education" courses are being taught in your school?
   a) yes = 29 responses
   b) no = 0 responses

2. Have you ever observed the distance education class(s)?
   a) yes = 20 responses
   b) no = 9 responses

   If yes, how would you rate the quality of instruction provided students (on a 5 point scale where "1" is "poor" and "5" is "excellent")? Avg. = 3.94

3. Have you taken any inservice training courses at your school that have been presented in a "distance education" delivery mode?
   a) yes = 11 responses
   b) no = 18 responses

   If yes, a) ESTIMATE the number of courses. Avg. = 2.25 courses

   b) Rate the quality of training presented (on a 5 point scale where "1" is "poor" and "5" is "excellent") Avg. = 4.3

   c) Did you interact with the tele-teacher during a course?
      a) yes = 4 responses
      b) no = 7 responses

   d) Did you interact with other teachers at your site during a course?
      a) yes = 6 responses
      b) no = 4 responses

   e) Did you interact with other teachers at other sites during a course?
      a) yes = 1 response
      b) no = 10 responses

4. Which type of inservice classes do you prefer?
   a) traditional inservice with an on-site trainer/instructor = 9
   b) training delivered via satellite = 10

Based on your knowledge of satellite courses offered to students at your school, answer the questions below, using the following five point scale:

Don't Know	Strongly Disagree				Strongly Agree
0	1	2	3	4	5

5. Satellite courses appear to be more difficult than traditional courses.	Avg. = 3
6. Students would do better in a traditional setting.	Avg. = 2.88
7. Students would rather take a satellite course than a course in a traditional setting.	Avg. = 3.05
8. The satellite teacher seems to be personable with students (seems to convey a feeling of caring about students).	Avg. = 4.55
9. The satellite courses will help students at our school get into college.	Avg. = 4.1
10. Students typically have to work harder during a satellite course than in regular classes.	Avg. = 3
11. Only certain students at this school are allowed to take a satellite course.	Avg. = 2.75
12. Offering courses via satellite teaching will significantly reduce job opportunities for regular classroom teachers.	Avg. = 1.83

13. Would you like to teach a satellite course?
   a) yes = 7 responses
   b) no = 20 responses

14. What are the two or three major strong points of the satellite teaching in your school?

   1. Ability to expand the curriculum. = 23 responses
   2. Ability to interact with other students. = 8 responses
   3. Being exposed to good teachers. = 4 responses

15. What are the two or three major weak points of the satellite teaching in your school?

    1. Conflicts in schedules. = 11 responses
    2. No personal contact with the teacher. = 7 responses
    3. Minor technical difficulties. = 5 responses

Facilitator Questionnaire
(7 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you certified to teach in the subject being offered?
   a) yes = 1 response
   b) no = 6 responses

2. How many satellite courses do you oversee? Avg. = 2.86

3. Are satellite courses at your school mostly geared for
   a) remedial students? = 0 students
   b) average students? = 2 students
   c) advanced students? = 7 students
   d) other? = 0 students

4. Is the satellite system used for teacher in-service training?
   a) yes = 4 responses
   b) no = 3 responses

5. ESTIMATE the total number of hours you spent training for your tasks in the satellite classroom. Avg. = 19 hours

6. ESTIMATE the total number of times students in an average satellite class talk to the tele-teacher each week. Avg. = 3 times

7. ESTIMATE the average number of students in a satellite class at your site. Avg. = 6 students

8. ESTIMATE the average number of students in an entire satellite class (including all sites). Avg. = 135 students

Answer the questions below, based on the following five point scale:

	Strongly Disagree				Strongly Agree
	1	2	3	4	5
9. Satellite courses appear to be more difficult than traditional courses.	Avg. = 2.57				

10. Students would do better in a traditional setting. Avg. = 2.71

11. Students would rather take a satellite course than a regular course. Avg. = 2.71

12. The satellite teacher seems as knowledgeable as the regular teachers in this school. Avg. = 4.71

13. I can easily contact the satellite teacher if I need to. Avg. = 4.57

14. The satellite course will help students get into college. Avg. = 4.29

15. Students have to work harder during a satellite course. Avg. = 3.14

16. Only certain students at this school are allowed to take a satellite course. Avg. = 2

17. Homework assignments are returned to the satellite students more slowly than to the regular students. Avg. = 3.71

18. Student cheating on tests or assignments occurs very infrequently in this satellite course. Avg. = 4.71

19. What are the system's strong points?

    1. Ability to expand the curriculum. = 5 responses
    2. Ability to videotape classes. = 2 responses
    3. Uses good teachers. = 2 responses

20. What are the system's weak points?

    1. Conflicting schedules. = 4 responses
    2. Hard to reach the teacher on the phone. = 2 responses
    3. Minor technical difficulties. = 2 responses

Student Questionnaire
(74 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. What year are you in school?
   a) 9th grade = 3 students
   b) 10th grade = 19 students
   c) 11th grade = 15 students
   d) 12th grade = 37 students
   e) other (explain) = 1 8th grader

2. ESTIMATE your grade point average for the past three years.
   a) "A" student = 27 students
   b) "B" student = 40 students
   c) "C" student = 8 students
   d) "D" student = 0 students

3. If you had a choice between enrolling in a satellite course or taking the same course in a regular classroom, which would you choose?
   a) regular class = 48 responses
   b) satellite class = 27 responses

4. Are you taking this course for Advanced Placement?
   a) yes = 7 responses
   b) no = 78 responses

5. How many satellite courses are you enrolled in? Avg. = 1.2 courses

Answer questions 6, 7, 8, 9 and 10 for your most enjoyable TV course. (If you are enrolled in only one course, then answer for that course.)

6. ESTIMATE the number of times during the last week that you contacted your "satellite teacher". Avg. = 1.3 times

7. ESTIMATE the number of times during the last week that your "satellite teacher" contacted you. Avg. = 0.32 times

8. Is this class an elective or is it required?
   a) elective = 84 responses
   b) required = 1 response

9. How many students are in the class at your site? Avg. = 6 students

10. ESTIMATE the number of students in the entire class (including all sites). Avg. = 135 students

Answer the questions below, based on the following five point scale:

Don't Know	Strongly Disagree				Strongly Agree
0	1	2	3	4	5

11. Satellite courses are more difficult than regular classes taught in school.	Avg. = 2.94
12. I could make a better grade if the course was taught in a regular setting.	Avg. = 3.37
13. I've gotten to know the students in my satellite course as well as the students in my regular classes, even though my satellite classmates are farther away.	Avg. = 1.81
14. I work more closely with the students in my on site satellite class than with students in my regular classes.	Avg. = 3.55
15. My satellite teacher is as friendly to me as most regular teachers in my school.	Avg. = 3.88
16. I can easily contact the satellite teacher to ask questions or make comments if I want to.	Avg. = 3.12
17. The satellite course(s) I am taking will help me get into college.	Avg. = 3.62
18. I have to work harder in my satellite course than I do during a regular class.	Avg. = 3.01
19. Only certain students at my school get to take a satellite course.	Avg. = 3.12
20. Homework assignments are returned more slowly in satellite courses than they are in most of my regular classes.	Avg. = 4.07

21. What are the three best things about a satellite course?

    1. Ability to expand the curriculum. = 21 responses
    2. A different and new experience. = 19 responses
    3. Ability to interact with students at other schools. = 17 responses

22. What are the three worst things about a satellite course?

    1. No personalized attention or relationship with the teacher. = 29 responses
    2. Difficult to ask questions. = 24 responses
    3. Minor technical difficulties. = 18 responses

Appendix C

Information contained in this case study was obtained via printed materials supplied by administrators from the TI-IN Network, the North Carolina State Department of Public Instruction, from survey data mailed to the 11 schools in the Western Region Educational Center service area which are participating in the TI-IN Network (surveys were mailed and returned during February and March 1989), and from on-site interviews and class observations with the following individuals on the dates listed below:

February 16, 1989

William A. Clauss
Director of Rural Education
Western Carolina University
Cullowhee, North Carolina

Ronda Davis
Regional Media and Technology Coordinator
Region 8 - Western Region Educational Center
Waynesville, North Carolina

Fred Harris
Principal
Blue Ridge School
Glenville, North Carolina

Kathy Day
Classroom Facilitator
Blue Ridge School
Glenville, North Carolina

TI-IN Marine Science Students (10 students)
Blue Ridge School
Glenville, North Carolina

February 17, 1989

Michael Rogers
Principal
Hiwassee Dam School
Murphy, North Carolina

Susan LeCharity
Classroom Facilitator
Hiwassee Dam School
Murphy, North Carolina

TI-IN French I Students (3 students)
Hiwassee Dam School
Murphy, North Carolina

Henry Davis
Assistant Superintendent
Robbinsville School District
Robbinsville, North Carolina

Gary Steppe
Principal
Robbinsville High School
Robbinsville, North Carolina

Charles George
Assistant Principal
Robbinsville High School
Robbinsville, North Carolina

Larry Raines
Teacher and TI-IN Site Manager
Robbinsville High School
Robbinsville, North Carolina

Ms. Yearjin
Guidance Counselor
Robbinsville High School
Robbinsville, North Carolina

TI-IN Calculus Students (3 students)
Robbinsville High School
Robbinsville, North Carolina

Revised Copy
May 1989

THE INTERACT INSTRUCTIONAL TELEVISION NETWORK: USING ITFS TECHNOLOGY FOR DISTANCE LEARNING IN THE HOUSTON METROPOLITAN AREA

Background Information

The InterAct Instructional Television Network is a 50 watt instructional television fixed service (ITFS) network licensed by the Federal Communications Commission. The network is managed and operated by the Region IV Education Service Center (Region IV ESC) in Houston, Texas. InterAct is a one-way video and two-way audio instructional TV network that provides programming in the areas of staff development, high school credit courses, university credit courses, adult education, and school board training. The network also serves as a medium for communication between teachers, administrators, the Texas Education Agency and other Texas based educational organizations. In addition, InterAct makes available channels on its network that can be leased by businesses and industries for training purposes in the Houston metroplex area.

In 1969, the Texas State Legislature established 20 educational service units as non-profit public agencies to provide services supporting quality education to both urban and rural schools. These education service centers first served as distribution hubs for films and audio visual equipment distribution, but they now offer a wide range of administrative, instructional and direct student services. The Region IV Education Service Center provides cooperative educational services to 56 school districts in a seven county area, serving approximately 600,000 students. The InterAct instructional television program is one aspect of the varied services offered to schools in the Center's service area. InterAct is a multi-use instructional TV network that serves the instructional and training needs of educators, college students, high school students, and corporate personnel in the seven counties that make up the Houston Gulf Coast region: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, and Waller (see Appendix A).

Educational Context and Community Served

Houston is the largest metropolitan area in Texas and the largest city in the South. The city is the nation's natural gas pipeline capital, headquarters for the country's international oil and tool trade, and the center of America's petrochemical industry. The NASA Space Center, located outside Houston, is an important command-post for America's space activities.

Houston is also an important educational center in the Southwest and the home of several community colleges, business colleges, law schools and technical schools. Principal institutions of higher education include Rice University, the University of Houston, Texas Southern University, Baylor University School of Medicine, and the University of Texas School of Dentistry.

Of the state's 1063 independent public school districts, 56 are in the seven county area served by Region IV Education Service Center, yet these districts have a total student enrollment that exceeds 600,000. Houston Independent School District alone enrolls 195,000 students. Approximately 40,000 professionals are employed at schools in Region IV ESC's seven county area.

Much of the urban area around Houston is faced with high traffic congestion and a growing population. During peak traffic periods, 20 miles of automobile travel across the city may require up to two hours of time. As early as 1975, Region IV ESC administrators began looking into alternative delivery systems to better serve educators and students in area schools. One concern has been the amount of travel required for staff development and other meetings designed to keep educators abreast of reforms, mandates, or changes in state educational policy periodically occurring in the state.

Increasing traffic congestion, rising transportation costs, and growing demands on time have combined to create a pressing need for an efficient system to provide training to the many educational professionals working in the Region IV service area.

In 1975, Region IV ESC received a $20,000 needs assessment grant from the U.S. Department of Commerce to explore satellite technology to improve delivery of staff development training and meetings for area educators. Results of the study at that time showed that a satellite system was cost prohibitive. In the process of looking at delivery alternatives, however, obtaining a high frequency TV station license (ITFS) was seen as a viable option. Administrators then began to investigate the possibility of obtaining a 10 watt ITFS license for the Center. After three years of continued investigation, a formal application for a 50 watt ITFS license was submitted to the Federal Communications Commission. In 1982, an ITFS license with call letters WHQ 281, was granted to Region IV ESC to broadcast at 50 watts power over the F-Group of channels as an Instructional Television Fixed Services station. Region IV leaders entitled the system "InterAct." The license gave the Center four channels for broadcast of low power, high frequency television signals. As owner of the license, Region IV ESC is assigned by the Federal Communications Commission overall control of the station and is responsible for course design and system management.

In September 1983, four districts viewed InterAct's inaugural broadcast. When first conceived, program plans focused on teacher and administrator needs. Initial offerings were non-credit teacher seminars and workshops. High school credit courses were considered when several area high school principals requested help in providing courses that typically had low student enrollments. In January 1984, InterAct offered its first four high school courses -- first and second year French, Technical Writing, and Probability and Statistics. Eighty-nine students enrolled.

Thirty-eight of the 56 school districts within the Region IV ESC, participate in Interact's instructional programming. Credit courses and training programs are provided for high school students, teachers, administrators, school board members, and classified school personnel. The network offers a variety of college credit courses and offers business training to two corporations as well.

In 1988, InterAct was awarded a second ITFS license. This gave the network an additional four channels, boosting its broadcast capability to eight channels. Since September 1988, three channels have been devoted chiefly to high school programming, four are used mostly for inservice or staff development training and one channel is designated for Houston Independent School District (HISD) for their use. With 195,000 students, HISD is one of the largest school districts in the United States. They have their own TV studio and use the channel largely for student enrichment, but also program staff development offerings and some high school courses. The channel is also used at night as a medium to download films and video from the central office that can be used the following day in Houston city schools.

Description of Technology Utilized and Programming Provided

InterAct operates as a high frequency TV ITFS channel licensed by the Federal Communications Commission (FCC). The FCC has developed strict guidelines governing the use of ITFS channels. ITFS licenses have been issued only to institutional or governmental organizations engaged in the formal education of enrolled students or to a nonprofit organization which intends to provide instructional material to such organizations. ITFS TV stations are intended primarily to provide a means for TV transmission of instructional and cultural material; serve as a medium for inservice training, safety training, professional development, and to keep professional groups apprised of developments in their fields (Arnall, 1984).

Like other ITFS systems, InterAct uses closed circuit microwave technology. Video and audio transmissions originate from classroom studios at Region IV ESC in northwest Houston. Broadcast signals for selected programs are also transmitted from studios at the Houston Independent School District central office and the University of Houston (see Appendix B). Microwave signals are transmitted to the top of the Texas Commerce Tower in downtown Houston. From there, they are dispersed via omnidirectional microwave over eight different channels to subscribing "receive" sites throughout the Gulf Coast counties. At 50 watts broadcast power in the relatively flat terrain of the Gulf Coast area, the signals have an approximate 50-60 mile line-of-site range from the radius of downtown Houston. Reception of the TV signals are possible only with a special antenna. Receive sites are equipped with a tower, antennae, down converter and talk-back transmitter. Receive site classrooms and conference rooms are equipped with modified television sets and talk-back microphones. The technology permits delivery of instruction in a one-way video, two-way audio talk-back format. More than 300 receive sites make up the network (1986 Annual Report). All transmissions (one-way video and audio out from the studio to the receive sites and audio talk-back from the receive sites to InterAct studios) are by means of microwave signals, with the exception of few schools (less than 5%) which use a dedicated telephone line for audio talk-back.

The microwave talk-back features at the receive site schools permit only one person to talk at a time. The student presses a push-to-talk microphone. Once a mike is depressed, it cuts out or prevents any other microphones from working until that individual student is through talking. Each mike is equipped with a small red light. If the light is "on," it means that another microphone is in use. When the red light goes "off," the audio frequency is open for communication back to the studio. The red light will go on again as soon as a student depresses the mike to either ask a question or make a comment. When a mike is depressed, the audio signal immediately goes through the receive site's talk-back transmitter box. The voice signal is carried by microwave to the Texas Commerce Tower where is it sent out via TV to the entire system. Once a student has depressed the microphone, a second student cannot "cut him/her off" or interrupt until the first student releases the microphone. Terry May, Director of the InterAct program stated, "The audio talk-back is faster than a reflex. While the system will select only one person at a time to talk, as soon as that person is off the audio [releases the depress button on the microphone], another can enter and this happens so rapidly that it is much like holding a regular conversation."

Observations of students in several InterAct classes, confirms that audio interaction between students and teachers is frequent and immediate. Some students push the microphones almost as if they were on a game show -- eager to be the first recognized. By means of comparison, the audio talk-back feature can be described as working much like a citizen's band radio. You depress a button to talk, at which time no one else can speak on the frequency. When you release the button, others may talk. Furthermore, the technology permits students to not only talk to the teacher, but they can freely talk to each other at different sites as well. The comparison with a citizen's band radio goes no further than this. The audio quality in terms of voice clarity is unquestionably better over InterAct's microwave than is the case with citizen's band radio. Nor does it seem to have the "noise" or static that is sometimes associated with calls made over telephone lines.

Exchange of printed materials such as tests, student homework assignments, handouts, etc. is carried out by a Region IV sponsored courier service that travels between InterAct offices and each of the receive site classrooms. The courier makes collections and deliveries twice per week, Tuesdays and Thursdays, across the network. InterAct teachers are encouraged to grade student papers as quickly as possible so that turn-around time does not extend beyond the next scheduled courier delivery.

InterAct operates five television studios at the Region IV ESC's office building. Three studios are devoted for high school programming. In each studio there are two cameras, one focused on the ITV teacher and an overhead camera mounted on the ceiling directly over the ITV teacher's desk. The overhead camera focuses down on messages written by the teacher on a writing pad that replaces a chalkboard. It also shows close-ups of books, models, pictures, or other materials displayed by the teacher. A studio operator handles all camera work, freeing the teacher to teach and interact with students. The operator switches cameras, operates the character generator, controls volume levels, and runs other equipment as needed. From the studio, the operator can display 35 mm slides, 35 mm film strips, 16 mm films, or videotapes the teacher has requested for the broadcast. The ITV teacher has a small TV monitor showing her what each student sees at the various remote sites.

In most cases the ITV teacher teaches to a camera, not to a live class. During the Spring semester, InterAct administrators invite students from participating schools to visit the studios and to attend their ITV class while it is being taught. This allows students to see the studios from which their TV class originates, lets them get better acquainted with their teacher, and permits students at distant sites to see some of their classmates. Teachers are required to make at least one on-site classroom visit to receive site classrooms every semester. This also allows the teacher and students to get to know each other in a face-to-face setting.

In order to provide an opportunity for students to talk to their teachers either before or after class, the ITV teachers are required to be in the studio 15 minutes before and an hour after each broadcast. Teachers are provided with an office and a telephone. Materials are transferred between students and teachers twice weekly by means of InterAct's mobile courier service.

Program Offerings

In six years, from the time of the first broadcast, InterAct's programming has ballooned. Over 200 different courses are offered for staff development and inservice training. Most of these courses are approved by the Texas Education Agency for Advance Academic Training credit. Inservice courses are typically offered in the afternoons or evenings to accommodate teachers' schedules. Region IV ESC's

1988 annual report records 1,581 hours of Advanced Academic Training (AAT) for teachers. AAT credit is used by Texas teachers for placement on the state's teacher career ladder system. The 1988 annual report showed 46 hours of school board training, 700 hours of university credit courses, 136 hours of programming from the Texas Education Agency, 130 hours of adult education, 2,624 hours of high school credit courses, 24 hours of Scholastic Aptitude Test preparation, and 21 hours of downlinked satellite broadcasts redistributed via ITFS (Annual Report, 1988).

From the first four high school credit courses offered in 1984, high school programming has now grown to over 20 sections of courses in Spanish I and II, French I and II, Latin I and II, German I and II, Psychology, Computer Programming, Calculus, Health, English honors, etc. High school classes are broadcast daily. Each credit class is 55 minutes in length. Beginning in the Fall of 1988, InterAct began offering dual credit English IV Honors (high school and college credit) for the first time. Enrollments for high school credit courses were 962 for Fall 1988 and 821 for Spring 1989. All InterAct high school credit courses are fully accredited by the Texas Education Agency.

Beginning in the Fall of 1986, the Texas Education Agency (TEA) began broadcasting agency news to teachers and administrators on a regular basis. TEA programs are aired live every Tuesday, thus providing local educators an opportunity to interact with state education personnel. William Kirby, Texas Commissioner of Education has lauded the innovative efforts of InterAct in promoting more effective communication between the Texas Education Agency and educators in the Houston area (Annual Report, 1986). As an example, in 1988, more than 4000 administrators region wide participated in an Administrative Training program, pursuant to mandates from the Texas Legislature and the Texas Education Agency (Annual Report, 1988).

A growing number of college credit courses are broadcast over the network. Registrants may attend classes at any of the network's receive sites located throughout the Houston Gulf area. Out-of-district personnel who wish to use a school ITV site must clear participation in advance with local school administrators. College credit courses are also delivered on-site to InterAct's two corporate subscribers, NASA and Texas Instruments. Among college credit providers are the University of Houston, University Park which offers masters degrees in business administration, computer science, and engineering; Houston Baptist University (HBU) offers a masters degree in business administration and a master of science in management. HBU also offers short courses in accounting, finance, general management, labor relations, sales and marketing, and personnel practice; and the Houston Community College system offers courses in technical writing, business English, office accounting, and U.S. history.

Credit courses delivered over the network are all taught in a live format. Students at any of the receive site locations watch their ITV instructor on regular television monitors and are able to talk live with the instructor or with other students at any or all sites. Other programming includes Scholastic Aptitude Test (SAT) review, adult basic education classes, General Education Development (GED) preparation, training for school bus drivers, State Board of Education meeting reports, and satellite conferences which are received at the Region IV offices and rebroadcast over InterAct.

Organization Structure and Program Costs

The Executive Director of the Region IV ESC oversees the InterAct Network. Twelve full time employees work for InterAct. Immediate and direct administrative supervision is provided by the Associate Director for School Services, who is assisted by the Coordinator for Programming. Twelve full time employees work with InterAct. Three positions are designated as professional appointments, two are professional/technical, two are secretarial, and the rest are technicians.

Eleven ITV teachers now teach high school courses over the network. Recruitment and selection of teachers is under the direction of the Associate Director for School Services and the Coordinator for Programming. Teachers receive a $3200 stipend for each class they teach. Instructors for high school courses are recruited from three large groups of public school teachers: retired teachers, teachers who are currently not employed full-time in secondary teaching assignments, and full-time university graduate students who hold teaching certificates. Newspaper advertisements, university placement offices, district personnel offices, and word-of-mouth are the major recruiting resources most used by InterAct. Candidates are selected on the basis of program needs, teaching credentials, teaching experience, academic achievement records, and their ability to communicate through the medium of television. Each prospective candidate is required to teach a sample lesson at the studio which is videotaped and reviewed by InterAct personnel. The final decision on selecting teachers is largely based on the quality of TV teaching performed at the studio. According to Elisabeth Scheidker, the high school German language instructor, teaching over InterAct has revitalized her interest in teaching. "One of my first reactions was that this [teaching over television] allowed for more creativity and excitement in my teaching. I find that I am much more prepared with my content and that I must consciously project myself through the camera to reach out to make certain that my students follow what I am saying. The experience has made me feel more professional in my work."

ITV teachers receive two full days of orientation/training at the beginning of each school year as part of their contract with InterAct. Items discussed include changes in InterAct procedures and policy, pre-service training in techniques for televised instruction, and familiarization with the Texas Teacher Appraisal System -- a state mandated appraisal system that is used across Texas to evaluate teachers on some 50 indicators of teaching effectiveness.

ITV teachers are evaluated informally on a on-going basis by InterAct personnel. A TV monitor showing high school courses in progress is viewed daily by the InterAct Program Coordinator. Every semester, each ITV teacher is formally evaluated using the Texas Teacher Appraisal Instrument, a state adopted form used in harmony with the Texas Teacher Appraisal System. ITV teachers are hired on a course-by-course basis, depending on the number of student enrollments. Several teachers have been with InterAct for a number of years.

Selection of teachers to present inservice training and staff development is driven to a large extent by individuals who possess the necessary content knowledge. This includes many Region IV training consultants on staff at the Center, TEA personnel, and college and university professors. Inservice presenters are provided with an orientation of the studio, shown the facilities, and given an opportunity to see how the equipment works. They learn how to plan their teaching materials over television. Emphasis is placed on using well designed and well produced visual aids, that will project well on the TV screen. Presenters are counseled to keep visual materials simple -- avoid putting too much information on any one visual. Presentation pointers such as speaking in a natural, conversational voice and establishing eye contact with the camera are stressed. Presenters are encouraged to vary the methodology used in their presentation, to intersperse visuals with lecture material, and to ask questions in order to create an opportunity for talk-back from viewers at the remote sites. Advice on grooming and dress are also shared with prospective presenters. Presenters are told what kind of clothes project the best image over television and those that should be avoided.

InterAct administrators are not actively involved in the selection of instructors who present college credit courses over the network. Colleges and Universities who use InterAct pay a fee to rent the broadcast studios and the use of the microwave network. For example, Houston Community College pays $1875 for a three hour course. Selection of courses and instructors is at the discretion of the respective college or university.

Program Costs and Funding Sources

Region IV ESC's operations are funded primarily from revenues provided by local schools for services purchased. Lesser amounts of funds come from state sources. Of state funds allocated yearly to Region IV ESC, about $90,000 goes to InterAct. Initial funding for the television receive and broadcast equipment, tower, and license to establish InterAct came from a National Telecommunications Information Agency (NTIA) grant of $330,000 in 1983. InterAct pays $90,000 per year to rent space on Texas Commerce Tower for transmitters and antennae. InterAct operating expenses are funded from two primary sources -- local annual subscription fees and local tuition from courses.

Two kinds of expenditures are required of school districts who participate with the network. The first is a one-time capital equipment purchase. Special equipment is needed to receive InterAct's microwave signal and convert it for use on a regular TV monitor in the classroom. Special equipment is also needed to send the students' voice back to the instructor via special microphones over an FM radio signal. The tower and antennae are the most expensive capital equipment items. They have an estimated 20 year life span, while the TV in the classroom, the microphones, and the talk-back transmitter box have an estimated 5-8 year life span. The location of the antenna must be line-of-site from the Texas Commerce Tower and no further than 50-60 miles distant. Costs for local equipment at InterAct sites varies from $5500 to $55,000. The site that paid $55,000 was 65 miles away from downtown Houston. They erected a 250 foot tower on which to mount their antenna. The school leases space on the tower to a number of carriers for over $1000 per month each. School administrators also elected to equip every classroom in their school with TV receive and audio transmit equipment. On the average, most schools have spent approximately $12,000 for capital purchase of equipment. This includes the tower, antenna, TV monitor, TV reception equipment, and the audio transmit equipment.

Districts also pay an annual subscription fee and tuition costs for credit courses received by the school. The annual subscription fee is based upon the number of professional employees reported on the Texas Education Agency Roster of Personnel. The rate is $8.00 per employee. For example, for a school district with 750 employees reported on the TEA Roster of Personnel, the annual subscription fee would be $6000 (750 x $8). This fee ($8.00 per employee) has been constant since the network first started in 1983. Payment of the annual subscription fee entitles schools to receive all inservice courses, enrichment classes, and special programs aired by InterAct. Only high school and college credit courses require an additional tuition fee.

Program costs for high school credit courses are determined on a pro-rated basis. The cost to each school is based on an ITV teacher salary of $3200 per class, plus $250 for materials and travel per site, and $.45 per student per instructional day to pay for the twice weekly courier service that carries materials between ITV teachers and students at area classrooms. These costs are totaled and pro-rated among participating schools. As an example, assume that a French language InterAct course has a total of 55 students divided between two schools, one with 10 students enrolled and the other with 45 students enrolled. The cost to each school is based as follows: The school with 10 students pays 18 percent of the teacher's $3200 stipend (10 divided by 55 = 18% x $3200 = $576). In addition, the school also pays

$391.50 for the InterAct courier service (10 students x $.45 x 87 instructional days in the semester), and finally $250 for teacher travel and materials. The total for the school with 10 students is $1217.5. The school with 45 students pays 82 percent of the $3200 teacher salary or $2624. They also pay $1761.75 for the courier service and $250 for teacher travel and materials. For the school with 45 students, the total cost is $4635.75. Appendix C provides a breakdown showing transmission, personnel, programming, and equipment costs.

Beginning in the Fall of 1988, a dual credit English course was offered for the first time on InterAct. Students electing to receive college credit are required to pay the college tuition fees themselves.

Role and Responsibility of Individual Schools

Courses taught over Interact are selected cooperatively by InterAct administrators and local districts through the Educational Advisory Committee. Each participating district appoints a Coordinator who serves on InterAct's Educational Advisory Committee. The committee meets via the network bi-monthly (five times during the school year) to decide on future programming, to discuss scheduling of classes, and to discuss other matters relative to the system.

High school courses are developed as a team effort by ITV instructors, InterAct supervisory staff, and InterAct production staff. Textbooks and other text related materials are selected from the Texas State Board of Education adoption list. Classes are aired five days a week with class periods of 55 minutes. Absentee policies are established at the local level. Schools are encouraged to videotape classes whenever a student is absent. InterAct does tape all classes and will provide a video to subscribing schools upon request.

Student enrollment criteria are determined by principals and counselors at each school. Students are withdrawn from an InterAct course at the initiation of the local campus or by InterAct teachers and administrators. Such action is usually taken if a student does not appear able to be successful in the remote learning environment. Students are evaluated periodically through the courses. Teacher made daily, weekly, or unit tests tract student progress. Formal written progress reports are provided at the third, ninth, and fifteenth week of each semester. These dates correlate with the issuance of report cards in students regular classes. Progress reports are followed by computer-generated report cards provided at the sixth, twelfth, and eighteenth weeks of the semester.

The fact that the teacher does not see the student has caused some InterAct teachers to be more objective in their grading of students. Pris Walker, the instructor for calculus and for mathematics of consumer economics, stated "As an InterAct instructor, you don't actually see your students while teaching, so you tend to feel more objective in evaluating their performance" (Region IV Review, November/December 1988, p. 11). To help assist the ITV teacher in the classroom, Kelli Durham InterAct Coordinator for Programming indicates, "The classroom monitor [facilitator] is the instructor's eyes in the district classroom, providing pertinent information to the teacher and assisting with classroom management. We attribute much of the success of InterAct high school courses to our classroom monitors. Since students are achieving well in our classes, it is obvious we have InterAct monitors who are doing their job well." Schools are required to have a class monitor/facilitator on site for every class broadcast.

Student-teacher ratios are limited to an overall maximum class size of 100 students for lecture type courses and 50 students for foreign language courses. When a course reaches a maximum ceiling, another section is created and is taught at a different time period. The Texas Education Agency does not permit InterAct to offer any science courses, such as physics or chemistry, that require one-third of the instructional time to be devoted to laboratory experimentation.

To help ensure proper communication from the InterAct offices to receive site schools, InterAct administrators identify a "district coordinator", "site manager", and "classroom monitor" at each site. The district coordinator is usually the school superintendent or a staff person designated by the superintendent. This person acts as a campus contact for all materials received from InterAct. One key responsibility of the district coordinator, as related to the program, is communication. Monthly program guides, periodic newsletters, and policies announcements are mailed from InterAct to the district coordinator at subscribing schools. The district coordinator shares information with administrators, faculty, and staff members. This is done by posting InterAct materials on bulletin boards, announcing information in faculty meeting or by talking to department heads, team leaders, or appropriate support personnel. Another major responsibility of the district coordinator is to represent the local district as a member of InterAct's Advisory Committee. The Advisory Committee meets bi-monthly (five times during the school year) to make requests for programming, to discuss concerns such a bell scheduling, etc.

InterAct sponsors an annual training meeting, over the network, for all district coordinators.

The site manager is selected by the district coordinator. Depending on the number of InterAct classrooms in a district or building, one or more site managers may be appointed to help facilitate InterAct programming at the school(s). Responsibilities of the site manager include opening and closing the ITV classroom, helping to distribute the monthly InterAct program guide, pre-registering and verifying participant attendance and returning required forms via the Region IV courier service to InterAct, ordering texts and other supplementary materials, helping students understand operation of the talk-back equipment, and other related activities. The site manager is typically a school counselor, administrator, or teacher in the local school. InterAct provides annual training sessions for site managers over the network.

Classroom facilitators or monitors are typically appointed by the site manager. These individuals are usually paraprofessionals. According to InterAct administrators, the monitor is the ITV instructor's eyes in the remote classroom, providing pertinent information to the teacher and assisting with classroom management. Their duties include turning on and checking the equipment each day, remaining in class with students for the entire 55 minutes of instruction, checking student attendance, picking up and distributing materials from the courier service when it arrives twice each week, handing out and collecting homework assignments, monitoring all exams, recording or requesting videotapes for students who are absent, maintaining student discipline, disseminating classroom materials, and performing other appropriate tasks as requested by the ITV teacher. InterAct also provides an annual training session for classroom monitors.

Evaluative Data

Districts are advised by InterAct administrators to carefully screen students planning to enroll for ITV classes. InterAct administrators suggest that higher achieving, college bound students who are self-motivated perform best in TV classes. Students participating in classes have achieved an overall passing level of 93% (Annual Report, 1987).

The growth of the network during the six years that it has been in operation is an indicator of its acceptance among users. Over 5000 high school students have enrolled for high school credit courses. The extent of inservice credit offerings have grown each year. In the words of Will Moore, Superintendent of Dayton Independent School District, "InterAct is great for us because it allows us to participate in meetings and inservice programs without leaving the district. More than 90 Dayton High School student participate in the network's course offerings. InterAct helps give our students a broader curriculum. We're actually able to offer our students a choice of four foreign languages." (Region IV Review, September/October, 1988, p. 8).

Terry May, InterAct Director reported, "The politics of starting a new delivery system such as InterAct has been interesting. When we first approached area superintendents, 55 of them said, 'Go ahead. We are right behind you.' The first year we had only four sign up. Now we have 37. They have since recognized the need for an alternative delivery. No one likes driving in Houston traffic. We have increased the amount of programming each year, the amount of committee meetings, and the things our users see being of value." Since its inception, only two districts have discontinued their subscription on the system."

One strength of the system noted during classroom observation was the peer tutoring that occurred among students at remote classrooms. On-site students can talk freely among themselves without the ITV teacher or students at other sites hearing them. Frequently, we observed students discussing a question, among themselves, that had been raised by the teacher before one of them depressed the microphone to respond directly to the instructor's questions. Several students stated that this feature of the InterAct system allowed them more freedom in class to work in a small group setting to help each other learn. During several observations, it was noted that some classroom monitors allowed -- even encouraged -- discussion among students as long as they stayed on task. The extent of peer tutoring, however, can vary. At one site, the classroom monitor attempted to keep the class from talking to each other or would whisper, "Shhh, shhh . . ." whenever they started to talk, even though their comments were directly related to the instruction being given by the teacher. In questioning her after the class, she reported that one of her assignments as an InterAct monitor was to maintain classroom discipline.

During interviews with several ITV students after classes, most expressed satisfaction with the approach to teaching and learning provided by the system. One student stated, "It's not the same as a teacher in the classroom, but we do get good instruction." Most seemed to prefer a regular teacher in a traditional setting if they had a choice, yet admitted that the course would not be available in their school if it were not offered over InterAct. Interestingly, most did not equate the quality of instruction received as a correlation of the method of delivery. They either liked their ITV teacher as a person or did not. For example, "He is real funny and keeps us excited," or "Sometimes she gets carried away and keeps on talking when its not really that interesting."

Survey Data

A total of 216 questionnaires were returned. These included five administrators, 11 tele-teachers, 22 regular classroom teachers (teachers not directly involved with the tele-system), nine facilitators and 169 students. (See Appendix D for detailed data).

Responses From Administrators

The average enrollment of the schools was 569 students. An average of 57 students at each site were taking one or more tele-courses. The administrators spent an average of 11 hours the previous semester evaluating the system. The administrators agreed that the quality of the tele-teaching was about as good as the quality of the regular teaching. All of the administrators felt that the parents the school boards were supportive of the use of tele-teaching.

On a scale of "1" equals "poor" to "5" equals "excellent", the administrators rated the quality of student learning via tele-courses at "3.4". The administrators indicated that the overall benefit of tele-courses was a "3.8", and that tele-courses were cost effective in terms of student learning. As weak points of the tele-learning system, two administrators expressed concern over the infrequent visits of the tele-teachers to the individual districts. One administrator reported that not all of the courses were cost effective in terms of students served, and another indicated that there was a lack of coordination between the districts and the vendor.

Responses From Tele-teachers

The tele-teachers had an average of nine years teaching experience and their own education levels ranged from several bachelor's degrees to a doctoral degree. They felt that the number of students in their tele-classes was within manageable limits for effective instruction. The tele-teachers reported spending an average of 45 minutes preparing a daily lesson plan for a TV course and estimated that it took four to five days for homework to be graded and returned to the students. The tele-teachers received an average of two or three telephone calls from the parents of students each semester and called a parent an average of two times each semester. They felt that tele-teaching technologies would not replace regular classroom teachers and reported that students in their classes were assigned as much homework as student in regular classes. They felt that cheating on tests and assignments occurred occasionally. The teleteachers said that students at different sites frequently interacted with each other during a tele-course. When asked to describe how a tele-class was different from a regular class, two-thirds of the tele-teachers said that it was difficult to achieve one-on-one communication with the students. Two tele-teachers said that teaching to a camera was different. Two others said that a tele-class required better preparation.

Responses From Regular Teachers

The regular teachers felt that students did not have to work as hard during a tele-course as they did in a regular class and would do better in a regular classroom setting. They did not feel that offering courses via tele-teaching would significantly reduce job opportunities for regular classroom teachers. As strong points of the tele-courses, 77 percent of the regular teachers felt that the ability to expand the schools' curriculum offerings was important. Eighteen percent of the regular teachers felt that the smaller class size was an advantage. Nine percent said that the exposure to good teachers was important. As weak points of the system, 45 percent of the regular teachers felt that the general lack of student/teacher interaction was a problem. Thirty two percent said that discipline in general and cheating in particular were problems. Eighteen percent felt that the slow turn-around time for homework grading and return presented difficulties for the students.

Responses From Facilitators

None of the facilitators were certified to teach in the subject being offered. They had an average of less than one hour of training for their position. They did not feel that tele-courses were more difficult for the students than traditional courses. They said that cheating on tests or assignments occurred occasionally in the tele-courses.

When asked about the system's strong points, 89 percent of the facilitators said that it expanded the school districts' curriculum offerings. Eleven percent felt that the increased likelihood for new student friendships was a strong point. As for the system's weak points, 56 percent of the facilitators mentioned discipline problems. Forty four percent said that there was no real relationship between the tele-teacher and the tele-students. Twenty two percent felt that the system was not cost effective and experienced minor technical difficulties.

Responses From Students

If given a choice between taking a regular class or taking a tele-class, 21 percent of the students said that they would take a tele-class. The students estimated that they asked a question or made a comment in the tele-class six or seven times per week, and that the tele-teacher called on the students about four times per week. Most of the students indicated that the tele-courses did not adversely affect their grade.

When asked to list the system's strong points, 21 percent of the students said that the tele-classes were easier. Nineteen percent of the students said that the system's ability to expand the curriculum was important. Eighteen percent said that the potential for meeting students and teachers from other schools was important. As for the system's weak points, 36 percent of the students said that it was difficult to contact the tele-teacher after class and get personalized attention. Nineteen percent said that they do not always get to ask the question that they wanted to. Eighteen percent mentioned discipline problems.

Plans for Future Development

The Federal Communications Commission granted Region IV ESC a second ITFS license in February 1988 for four additional channels, making InterAct an eight channel low power instructional television network. Programming capacity has doubled. In 1988, 6000 square feet of new studio space and production facilities were to InterAct in Region IV ESC's complex. According to Terry May, "In terms of channel capacity, programming time, population served and area served, this makes InterAct one of the largest education TV operations in the country." May hopes to add yet another four channels over the next four to five years. This would allow InterAct to serve yet more schools in the same manner that they are now provided programming. It is anticipated in the future that some of the colleges or universities which broadcast over the network might obtain their own TV transmitter, thereby enabling them to broadcast from their home campuses rather than travel to the InterAct studios.

Summary

Fourteen years ago, administrators at Region IV ESC recognized the need to investigate alternative delivery mechanisms as a means to deliver inservice training programs to school administrators, teachers, and classified personnel. The intent was to keep educators up-to-date regarding legislative mandates, federal policies, state guidelines, and other issues that impact education. A pressing concern was the inefficient practice of trying to provide training for some 40,000 educators in a handful of meeting places scattered throughout the Houston area. Not only were meeting facilities and space limited, but time lost in travel, especially during peak traffic periods, was both frustrating for educators and counter productive. Finding a more efficient way for educators to share information with one another and keep on top of the constant information flow from federal, state, and professional sources was an important concern which Region IV administrators felt had to be addressed. What started as a perceived need to better accommodate the training needs of educators has grown to an eight channel delivery network that not only helps to meet that need, but has also expanded to provided increased learning opportunities for high school students in the area and other adults throughout the Houston Gulf Coast region.

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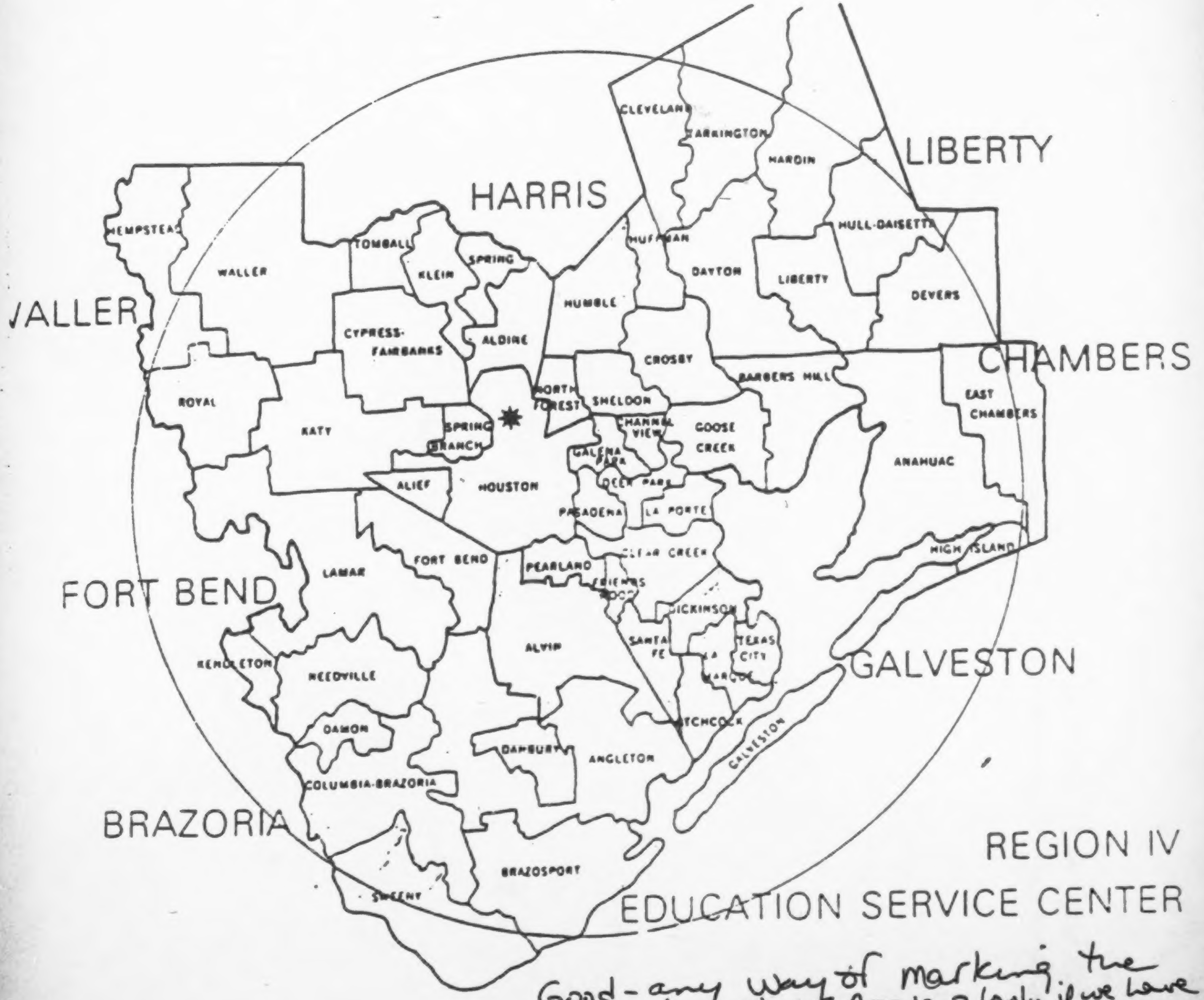
InterAct Instructional Television Network

Appendix A


LIBERTY
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ALLER
CHAMBERS
FORT BEND
GALVESTON
BRAZORIA
REGION IV
EDUCATION SERVICE CENTER
CLEVELAND
TARKINGTON
HARDIN
HULL-DAISETTA
HUFFMAN
DAYTON
LIBERTY
DEVERS
HEMPSTEAD
WALLER
TOMBALL
KLEIN
SPRING
HUMBLE
CYPRESS-FAIRBANKS
ALDINE
CROSBY
BARBERS HILL
EAST CHAMBERS
ROYAL
KATY
NORTH FOREST
SHELDON
SPRING BRANCH
CHANNELVIEW
GOOSE CREEK
GALENA PARK
ALIEF
HOUSTON
DEER PARK
ANAHUAC
PASADENA
LA PORTE
CLEAR CREEK
HIGH ISLAND
FORT BEND
PEARLAND
LAMAR
FRIENDSWOOD
DICKINSON
ALVIN
SANTA FE
TEXAS CITY
LA MARQUE
KENDLETON
NEEDVILLE
HITCHCOCK
GALVESTON
DAMON
DANBURY
ANGLETON
COLUMBIA-BRAZORIA
BRAZOSPORT
SWEENY

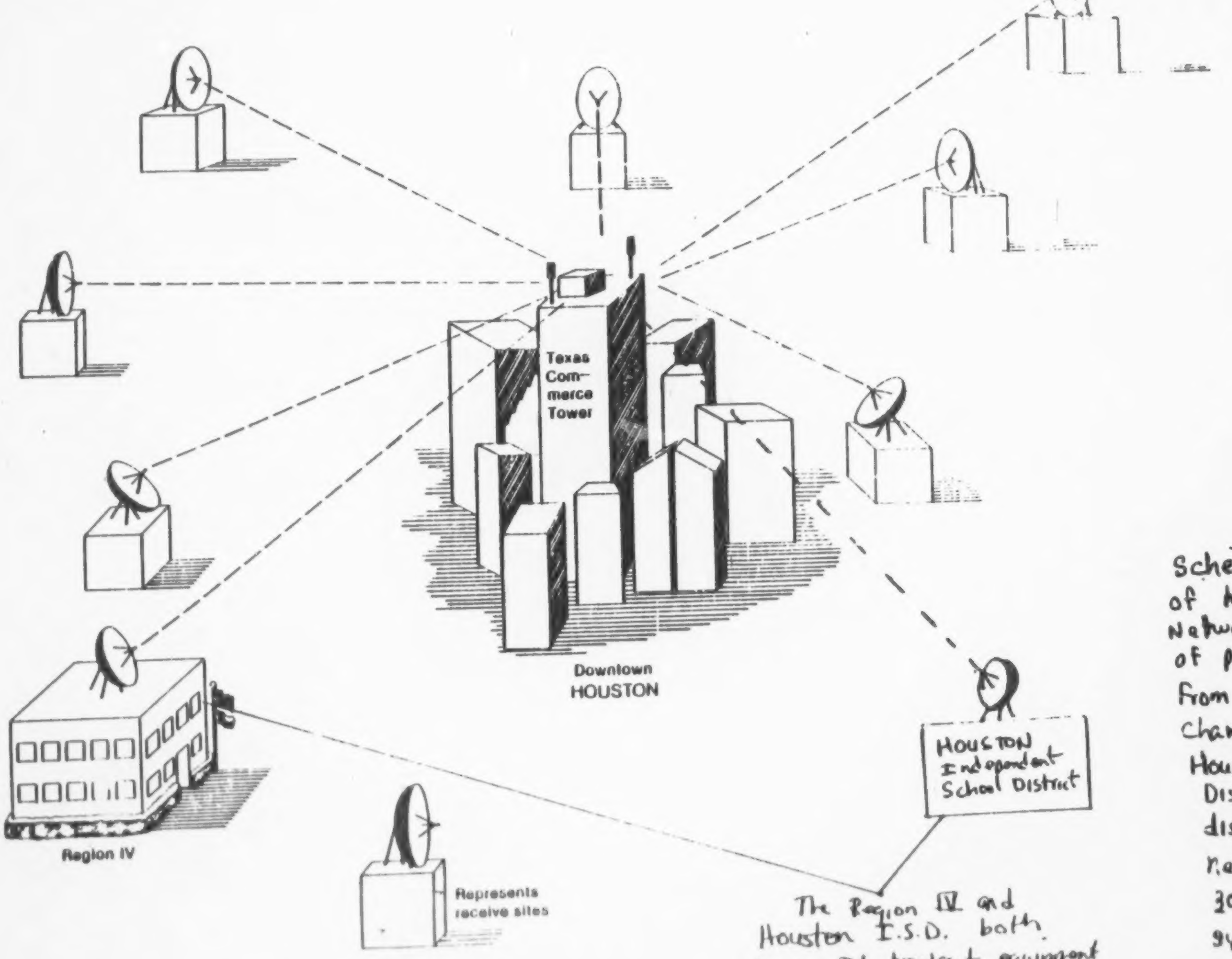
Good - any way of marking the participating schools? (only if we have it, otherwise don't worry)

Depiction of seven county service area in the Houston-Gulf coast serviced by Region IV Educational Service Center's InterAct Instructional Television Network.

Good !

APPENDIX B

The InterAct System


Texas
Com-
merce
Tower
Downtown
HOUSTON
HOUSTON
Independent
School District
Region IV
Represents
receive sites

The Region IV and Houston I.S.D. both have TV broadcast equipment to beam broadcasts to Texas Commerce Tower. Signals

Schematic representation of how the InterAct Network works. Seven channels of programming originate from Region IV Studios, One channel originates from Houston Independent School District. Thirty-Seven districts subscribe to the network. With approximately 300 school linked to the system, Spring, 1989,

Appendix C

Estimate of Costs to Receive Tele-courses Via Satellite From the Perspective of Member Schools Participating in the InterAct Instructional Television Network

Equipment and installation:	12,000.00	
Subscription fee:	8.00	per school district employee
	3,200.00	per class for teacher salary (pro-rated according to the number of students at each site)
	250.00	per class for materials and travel
	.45	per student per instruction day

Personnel: Tele-teacher for each course
Facilitator for each classroom

Note: The cost to each school is pro-rated on a per-student basis. For example, if 45 students at one site and 10 students at another site are taking a course, the smaller class pays 18 percent of the teacher's salary.

Appendix D

Results From Interact Questionnaires

Administrator Questionnaire
(5 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. ESTIMATE the total enrollment of your school. Avg. = 569

2. ESTIMATE how many students in your school are enrolled in tele-courses. Avg. = 57

3. Describe the academic level of students participating in [illegible] courses.
   a) mostly "A" and "B" students = 3 students
   b) mostly "C" students = 0 students
   c) mostly "D" and "F" students = 0 students
   d) all types of students = 2 students

4. How would you describe the classroom manager/facilitator of tele-courses?
   a) certified teacher in subject area being taught = 0 facilitators
   b) certified teacher, but not in subject area being taught = 4 facilitators
   c) teacher aide = 2 facilitators
   d) volunteer = 0 facilitators
   e) other = 0 facilitators

5. ESTIMATE the number of hours you spent last semester observing the tele-course(s) in your school. Avg. = 11

Based on your experience with students being taught via satellite, answer the questions below, using the following five point scale:

Strongly Disagree — Strongly Agree

1 2 3 4 5

6. The quality of the tele-teaching in our school is as good as the quality of our regular teaching. Avg. = 3.2

7. Regular classroom teachers in our school feel their jobs are threatened by "distance education" instruction. Avg. = 1.4

8. The teacher union (or state teachers' organization) in our state is supportive of the use of tele-teaching in our school. Avg. = 3.2

9. Parents in our district are supportive of the use of tele-teaching in our school. Avg. = 3.6

10. Our school board is supportive of the use of tele-teaching in our school. Avg. = 4

Rate each of the following items on the basis of "Poor" to "Excellent":

Don't Know	Poor				Excellent
0	1	2	3	4	5

11. Attitude of students toward tele-courses. Avg. = 3

12. Attitude of students toward tele-teachers. Avg. = 3.2

13. Quality of student learning achieved via tele-learning. Avg. = 3.4

14. Overall attitude of teachers in your school regarding quality of courses taught via tele-teaching. Avg. = 2.8

15. Use of audio-visual aids in tele-courses (e.g. pictures, overhead transparencies, films, videos, etc.). Avg. = 3.75

16. Frequency of actual teacher/student interaction in tele-courses (that is, tele-teacher actually addressing individual students and students verbally responding to tele-teacher). Avg. = 3

17. Benefit of tele-courses to your school's instructional program. Avg. = 3.8

18. Cost effectiveness of tele-courses -- that is, has the learning achieved by students been worth the money? Avg. = 3.2

19. Do you formally evaluate the tele-teachers in the same way you evaluate the regular teachers?
    a) yes = 0 formal evaluation
    b) no = 5 formal evaluation

20. What are the two or three major benefit(s) of tele-courses for your school?

    1. Ability to expand curriculum. = 5 responses
    2. Aids scheduling and takes advantage of new technology. = 2 responses
    3. Some courses are cost effective. = 1 response

20. What, if any, have been the major problems you've encountered?

    1. Infrequent visits by tele-teachers to the district. = 2 responses
    2. Minor technical difficulties and expense. = 2 responses
    3. Expensive and lack of coordination between district and Education Service Center. = 2 responses

Tele-teacher Questionnaire
(5 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. How many years have you taught school? Avg. = 8.8 years

2. How many years have you been teaching TV courses? Avg. = 1.45 years

3. Do you teach any regular classes?
   a) yes = 3 responses
   b) no = 8 responses

4. What is your highest college degree?
   Bachelors = 4
   Masters = 6
   Doctorate = 1

5. Did you receive training for your TV teaching assignment?
   a) yes = 7 responses
   b) no = 4 responses

6. How many students are enrolled in your TV course(s)?
   Avg. = 80 students

7. How many sites are there in your TV course(s)? Avg. = 7 sites

8. When working with the interactive teaching technology, are you able to recognize each of your students and call on them by name?
   a) yes = 7 responses
   b) no = 4 responses

9. ESTIMATE what you think is the ideal class size (all sites combined) for a distance education class. Avg. = 33 students

10. At what point do you think class size (all sites combined) becomes too large? Avg. = 63 students

11. ESTIMATE how long it takes, on the average, to prepare a daily lesson for your TV course. Avg. = 43 minutes

12. ESTIMATE how many days it takes for students in your TV course to have their homework assignments/tests graded and returned to them.
Avg. = 4.7 days

13. For a typical tele-course, ESTIMATE the number of telephone calls you receive from parents of students during an average semester.
Avg. = 2.8 calls

14. For a typical tele-course ESTIMATE the number of telephone calls you initiate to parents of students during an average semester.
Avg. = 2 calls

15. Is your tele-teaching formally evaluated by school principals (or other administrators) at distant site locations?
a) yes = 0 responses
b) no = 11 responses

16. Is your TV course(s) mostly geared for
a) remedial students? = 1 student
b) average students? = 5 students
c) advanced students? = 4 students
d) mixture of all of these = 1 student

17. Do you receive a higher salary for teaching TV courses than you would if you taught in a regular classroom?
a) yes = 6 responses
b) no = 5 responses

18. Do you have a reduced teaching load, as compared to a regular teacher, because you are a TV teacher?
a) yes = 3 responses
b) no = 8 responses

19. What are the THREE most important ways that tele-teaching is different from regular classroom teaching?

1. It is difficult to have one-on-one communication. = 6 responses
2. It is difficult to judge the class mood and you teach to a camera. = 4 responses
3. It is more structured and the students have to pay more attention. = 4 responses

Answer the questions below, based on the following five point scale:

Strongly Disagree — Strongly Agree
1 2 3 4 5

20. Tele-teaching technologies will replace regular classroom teachers.	Avg. = 2.18
21. Preparing lesson materials for delivery via tele-teaching technologies is much more time consuming than preparing lessons for regular teaching.	Avg. = 2.55
22. Students in my tele-course(s) are assigned as much homework as students in regular classes.	Avg. = 4
23. Student cheating on tests or assignments occurs very infrequently in my tele-course(s).	Avg. = 3.09
24. Students at different sites frequently interact (exchange questions, comments, or otherwise talk back and forth with each other) during my tele-course(s).	Avg. = 3.64

Regular Teacher Questionnaire
(22 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you aware that "distance education" courses are being taught in your school?
   a) yes = 21 responses
   b) no = 1 response

2. Have you ever observed the distance education class(s)?
   a) yes = 14 responses
   b) no = 8 responses

   If yes, how would you rate the quality of instruction provided students (on a 5 point scale where "1" is "poor" and "5" is "excellent")? Avg. = 3

3. Have you taken any inservice training courses at your school that have been presented in a "distance education" delivery mode?
   a) yes = 15 responses
   b) no = 7 responses

   If yes, a) ESTIMATE the number of courses. Avg. = 3.3 courses

   b) Rate the quality of training presented (on a 5 point scale where "1" is "poor" and "5" is "excellent") Avg. = 3

   c) Did you interact with the tele-teacher during a course?
      a) yes = 10 responses
      b) no = 5 responses

   d) Did you interact with other teachers at your site during a course?
      a) yes = 13 responses
      b) no = 2 responses

   e) Did you interact with other teachers at other sites during a course?
      a) yes = 4 responses
      b) no = 11 responses

4. Which type of inservice classes do you prefer?
   a) traditional inservice with an on-site trainer/instructor = 15
   b) training delivered via one-way TV. = 3

Based on your knowledge of tele-courses offered to students at your school, answer the questions below, using the following five point scale:

Don't Know	Strongly Disagree				Strongly Agree
0	1	2	3	4	5

5. Tele-courses appear to be more difficult than traditional courses. Avg. = 1.69

6. Students would do better in a traditional setting. Avg. = 4.18

7. Students would rather take a tele-course than a course in a traditional setting. Avg. = 3

8. The tele-teacher seems to be personable with students (seems to convey a feeling of caring about students). Avg. = 3.29

9. The tele-courses will help students at our school get into college. Avg. = 3.07

10. Students typically have to work harder during a tele-course than in regular classes. Avg. = 2.06

11. Only certain students at this school are allowed to take a tele-course. Avg. = 1.82

12. Offering courses via tele-teaching will significantly reduce job opportunities for regular classroom teachers. Avg. = 2.31

13. Would you like to teach a tele-course?
    a) yes = 1 response
    b) no = 20 responses

14. What are the two or three major strong points of the TV teaching in your school?

    1. Ability to expand the curriculum. = 17 responses
    2. The classes are smaller. = 4 responses
    3. Being exposed to good teachers. = 2 responses

15. What are the two or three major weak points of the satellite teaching in your school?

    1. Less student-teacher interaction. = 10 responses
    2. Student cheating and discipline. = 7 responses
    3. Slow homework return. = 4 responses

16. ESTIMATE the number of times you have observed instruction on the tele-system in your school. Avg. = 13.6 times

Facilitator Questionnaire
(28 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you certified to teach in the subject being offered?
   a) yes = 0 responses
   b) no = 9 responses

2. How many tele-courses do you oversee? Avg. = 3

3. Are tele-courses at your school mostly geared for
   a) remedial students? = 0 students
   b) average students? = 4 students
   c) advanced students? = 5 students
   d) other? = 0 students

4. Is the tele-system used for teacher in-service training?
   a) yes = 8 responses
   b) no = 1 response

5. ESTIMATE the total number of hours you spent training for your tasks in the tele-classroom. Avg. = .875 hours

6. ESTIMATE the total number of times students in an average satellite class talk to the tele-teacher each week. Avg. = 3 times

7. ESTIMATE the average number of students in a tele-class at your site. Avg. = 14 students

8. ESTIMATE the average number of students in an entire tele-class (including all sites). Avg. = 73 students

Answer the questions below, based on the following five point scale:

	Strongly Disagree				Strongly Agree
	1	2	3	4	5
9. Tele-courses appear to be more difficult than traditional courses.	Avg. = 2.22				

10. Students would do better in a traditional setting. Avg. = 3.78

11. Students would rather take a tele-course than a regular course. Avg. = 3

12. The tele-teacher seems as knowledgeable as the regular teachers in this school. Avg. = 4

13. I can easily contact the tele-teacher if I need to. Avg. = 4.5

14. The tele-course will help students get into college. Avg. = 3.75

15. Students have to work harder during a tele-course. Avg. = 2.13

16. Only certain students at this school are allowed to take a tele-course. Avg. = 1.5

17. Homework assignments are returned to the tele-students more slowly than to the regular students. Avg. = 3.25

18. Student cheating on tests or assignments occurs very infrequently in this tele-course. Avg. = 2.75

19. What are the system's strong points?

    1. Ability to expand the curriculum. = 8 responses
    2. Interact with students at other schools. = 1 response
    3. Ability to offer teacher inservice. = 1 response

20. What are the system's weak points?

    1. Discipline can be a problem. = 5 responses
    2. No real teacher-student relationship. = 4 responses
    3. Minor technical problems. = 6 responses

Student Questionnaire
(169 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. What year are you in school?
    - a) 9th grade = 6 students
    - b) 10th grade = 60 students
    - c) 11th grade = 53 students
    - d) 12th grade = 50 students
    - e) other (explain) = 0 students
2. ESTIMATE your grade point average for the past three years.
    - a) "A" student = 44 students
    - b) "B" student = 98 students
    - c) "C" student = 27 students
    - d) "D" student = 0 students
3. If you had a choice between enrolling in a tele-course or taking the same course in a regular classroom, which would you choose?
    - a) regular class = 135 responses
    - b) tele-class = 134 responses
4. Are you taking this course for Advanced Placement?
    - a) yes = 67 responses
    - b) no = 102 responses
5. How many tele-courses are you enrolled in? Avg. = 1 course

Answer questions 6, 7, 8, 9 and 10 for your most enjoyable TV course. (If you are enrolled in only one course, then answer for that course.)

6. ESTIMATE the number of times during the last week that you contacted your "tele-teacher". Avg. = 6.6 times
7. ESTIMATE the number of times during the last week that your "tele-teacher" contacted you. Avg. = 4 times
8. Is this class an elective or is it required?
    - a) elective = 136 responses
    - b) required = 33 responses

9. How many students are in the class at your site? Avg. = 14 students

10. ESTIMATE the number of students in the entire class (including all sites). Avg. = 78 students

Answer the questions below, based on the following five point scale:

	Don't Know	Strongly Disagree				Strongly Agree
	0	1	2	3	4	5
11. Tele-courses are more difficult than regular classes taught in school.	Avg. = 2.87					
12. I could make a better grade if the course was taught in a regular setting.	Avg. = 3.37					
13. I've gotten to know the students in my tele-course as well as the students in my regular classes, even though my tele-classmates are farther away.	Avg. = 2.12					
14. I work more closely with the students in my on site tele-class than with students in my regular classes.	Avg. = 3.06					
15. My tele-teacher is as friendly to me as most regular teachers in my school.	Avg. = 3.5					
16. I can easily contact the tele-teacher to ask questions or make comments if I want to.	Avg. = 3.89					
17. The tele-course(s) I am taking will help me get into college.	Avg. = 4.06					
18. I have to work harder in my tele-course than I do during a regular class.	Avg. = 2.91					
19. Only certain students at my school get to take a tele-course.	Avg. = 1.89					
20. Homework assignments are returned more slowly in tele-courses than they are in most of my regular classes.	Avg. = 3.67					
21. The tele-teacher knows all of the students at my site by name.	Avg. = 3.2					

22. The tele-teacher asks more questions during class than most regular teachers do. Avg. = 3.39

23. What are the three best things about a tele-course?

1. The classes are easier. = 35 responses
2. Ability to expand the curriculum. = 32 responses
3. Ability to interact with students at other schools. = 30 responses

24. What are the three worst things about a tele-course?

1. Not much personal attention. = 61 responses
2. Difficult to ask questions. = 32 responses
3. Discipline is sometimes a problem. = 30 responses

Appendix E

Information contained in this case study was obtained via printed materials supplied by administrators from the InterAct offices at the Region IV Education Service Center in Houston; from survey data mailed to a random sample of participating schools on the network and returned from them in January, February, and March 1989; and from on-site interviews and class observations with the following individuals on the dates listed below:

February 9, 1989

Terry May
Associate Director for School Services
and InterAct Director
Region IV Education Service Center
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Houston, Texas 77092

Kelli Durham
InterAct Coordinator for Programming
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Holly Sevard
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Al Nolan
Counselor and InterAct Site Manager
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LaPorte Independent School District
301 East Fairmont Parkway
LaPorte, Texas 77571

Patty Brough, Teacher Aid and
InterAct Classroom Monitor
LaPorte High School
LaPorte Independent School District
301 East Fairmont Parkway
LaPorte, Texas 77571

German I and Latin II Students
 in InterAct Classes
LaPorte High School
LaPorte Independent School District
301 East Fairmont Parkway
LaPorte, Texas 77571

February 10, 1989

Joyce Zotes
Assistant Principal for Curriculum and Instruction
North Shore High School
Galena Park Independent School District
13501 Holly Park
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English IV Honors Students
 in InterAct Class
North Shore High School
Galena Park Independent School District
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Helen Herderjurgen, Teacher Aid
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Revised Copy
May 1989

THE DELAWARE-CHENANGO BOCES: AN AUDIOGRAPHICS NETWORK OF SMALL SCHOOL DISTRICTS IN UPSTATE NEW YORK STATE

Background Information

When people speak of New York, thoughts are often centered around Long Island, Times Square, Manhattan, or Madison Square Garden -- those aspects of New York City that seem to underscore the area as one of America's most populated urban and cultural centers. Despite the dominance of New York City and its populous boroughs, much of New York State is rural with small villages separated by dairy farms and gentle rolling hills.

Based on a report from the New York State Education Department, 12 different distance education programs were operative in the state in 1986, most of these being located in rural areas upstate (Operating Distance Learning Projects in New York State, 1987). One of the pioneer projects is the Telelearning Project administered by the Delaware-Chenango Board of Cooperative Educational Services (BOCES), and the focus of this case study. The network is an audiographics linkage between 10 of the 18 school districts within the Delaware-Chenango service area. The Telelearning Project has been in operation since January 1985. High school credit courses and student enrichment programs have been offered in several subject areas.

Educational Context and Community Served

The state of New York funds 41 BOCES that are to provide services to the K-12 public schools in their region. The BOCES units provide support to the public schools in six areas: special education, occupational education, adult education, administrative services, instructional support services, and instructional resource sharing. The schools within each BOCES region select those services they desire and pay a fee. The fee is partially subsidized by the state.

Administrative offices for the Delaware-Chenango BOCES are located in Norwich, about 50 miles northeast of Binghamton along New York's southern tier. The 18 districts in the Delaware-Chenango BOCES service region are spread across portions of four different counties in rural upstate New York. Many of the 44 schools in the region are small and have problems providing students with a full curriculum. Some students in the region have very little exposure to the world outside of their small communities (Gilcher and Johnstone, 1988).

The Telelearning Project was established to (1) help provide an alternative that could be used to enhance educational opportunities for students, and (2) to expand high school credit offerings in the curriculum for the regions very small schools (Clark, 1987). Some of the school districts in the area are separated by as much as 70 road miles. Sharing instruction via audiographics was seen as a cost-effective technique that would benefit students, teachers, and administrators.

Description of Technology Utilized and Programming Provided

The Delaware-Chenango BOCES Telelearning Project uses an audiographics teleconferencing system. Participating schools are connected via telephone lines into the BOCES' Instructional Support Services office in Norwich. A MicroLinx bridge at the BOCES central office is able to connect any configuration of six sites together at one time. With upgrading, the bridge has the capacity to link a total of any 14 sites at one time. The configuration of sites linked together can be easily adjusted by BOCES staff at Norwich. The audiographic system permits two-way audio interaction and two-way microcomputer networking between all the sites that are connected to each other over the bridge. Visuals on the computers can be created using multiple colors with special audiographics software and these can be "telecommunicated" in real-time via modem from one microcomputer to another. Since on-line transmission of graphics is relatively slow, visuals prepared in advance of class are stored on floppy disks and the disks sent via BOCES courier to the student sites.

The telecommunications software used is Telewriter II from Optel Communications Incorporated of New York City. Each site has a graphics tablet that students and/or the teacher can write on at will. The tablet serves as an electronic "chalkboard." Sketches, numbers, writing, etc. performed on the tablet can be transmitted immediately to all computer screens on the network. Interaction on the computer (exchange of visuals between sites or use of the graphics tablet) is possible at anytime while on-line between the teacher and students or between students at different sites.

Voice communication between sites is via speaker telephones, leaving the hands free to work with the computer keyboard or to use the graphics tablet. Students can speak with their teacher or peers as graphics or text are being conveyed via computer. Each site is also equipped with a fax machine for exchange of written materials, homework, tests. In some instances, materials between the teacher and students are mailed.

Optel's voice-data modem allows for both voice (audio speaker phone interaction) and data (computer visuals) to be carried on a single telephone line from each site. No special switching is required.

Instruction can originate from any of the sites. The teleteacher is typically a teacher in one of the schools who has accepted the added task, with overload pay, of teaching a teleclass. Classes are taught with or without students at the originating school.

System operation at each site is described by BOCES administrators as being fairly simple. Orientation sessions are held during the summer for new teachers and at the beginning of the school year for students. Observations of students learning over the network indicate students are very comfortable working the equipment, interacting freely with the graphics tablet (electronic chalkboard), asking questions, and making comments to the teacher and other students via the speaker telephone.

Several factors are inherent in an audiographics delivery approach: (1) students in separate schools and do not see each other or the teacher; (2) the teacher does not see the students; and (3) all participants in the learning process (teacher and students) are looking at computer screens to share a common visual reference and communicating by voice over speaker telephones. According to Martin (1986), a former coordinator for the Telelearning Project,

> Since the teacher cannot see the students he must get oral and/or visual feedback [via the computer and/or speaker telephone] from them to make sure they understand the material. This system-based necessity also give telelearning its most

> potentially positive feature: the necessity for interaction. For this system to work, the students must be involved in the learning process. They must be participants, not recipients. To make this happen we spent a lot of time talking about how we could involve the students in the class (p. 2).

Program Offerings

The BOCES's Telelearning Project has been operational since 1985. The first pilot class offered was a mini-course (non-credit) in astronomy. The class originated from New Berlin High School and was received by 25 students at six other high schools. The course was taught after school (in order to accommodate varying in bell schedules) two days per week for 45 minutes over an eight week period, or 16 times. All but three completed the course. Several reported in a survey at the end of the class that they actually preferred not seeing the teacher (even though they didn't know him) because it was less distracting.

Following the successful pilot class, a full-fledged Advanced Placement (AP) Calculus course was offered to 13 students divided among four different schools. In 1986-87, three high school classes were offered: AP Calculus, AP English, and Spanish 3. For the 1987-88 school year, five high school courses were offered: AP Calculus, AP Chemistry, AP English, AP European History, and Music Theory. The number of schools linked together for courses typically ranged between three to five. Most recently (1988-89 school year) only two high school credit courses were offered, AP English and AP Calculus. Both the AP English and AP Calculus courses are offered for dual credit in area colleges. Students who elect to enroll for the college credit option are responsible to pay the tuition fee. High school classes are delivered five days per week. Each run about 45 minutes.

As depicted in Figure 1, the number of member schools, extent of course offerings, and student participation in audiographic courses had dropped in the past year.

Figure 1

	1985-86	1986-87	1987-88	1988-89
No. of Schools	13	12	11	10
No. of Courses	3	3	5	2
No. of Students	38	38	40	15

According to BOCES personnel, problems in bell scheduling, changes in New York Regents' core curriculum requirements, and a couple of less than effective teleteachers are some of the causes for the drop in enrollment. Freeman Van Wickler, BOCES Executive Officer, indicated several other reasons, "When we first started the project we hired outside teachers [educators not already employed in the BOCES's area] who did an excellent job and excited students. Because of teacher union concerns the second year, we released these people and hired teleteachers within the ranks of teachers already teaching in schools serviced by the BOCES. Several of the teachers did not adapt well to the technology. Consequently, the students were not as enthusiastic as previously. Another problem, and a very significant one, is a decrease in state-aid for schools. As badly as some of our smaller schools need these courses, they are hard pressed to secure funds to pay the membership fee and program costs. Finally, we've had four different administrators in charge of the Telelearning Project in as many years. There simply hasn't been the continuity to keep the program advancing. I believe we are now over this. We have a person in place who is working closely with the schools, seeking input to better accommodate individual school's need, and striving to market our services and improve our image."

Limited inservice programming has been provided. All decisions for course offerings are made by Telelearning Project administrators with input from administrators at participating schools. According to Linda Gorton, Telelearning Project Coordinator, "One factor that will bring a resurgence of audiographics courses to the Telelearning Project is better training of prospective teleteachers. In the last couple of months we've trained 10 teleteachers. We now have a cadre of personnel who want to teach telecourses and know how to do so effectively. With quality teleteachers teaching courses, the program will sell itself among students, other teachers, and administrators."

Two schools in the BOCES service area have used audiographics to teach homebound students. At one school, an eighth grade student was given audiographics equipment to use at home while recuperating from back surgery. The computer, graphics tablet, and speaker phone made it possible to provide classroom instruction to the student at home, allowing him to participate in class discussion and not fall behind his peers.

Telelearning Project administrators are interested in offering more than just audiographics classes. A unique feature is the "electronic field trip." And, even though program offerings for audiographic courses have declined over the past year, interest in electronic field trips is one service which has remained very popular. Over 50 electronic field trips are conducted by schools in the BOCES region each year. An electronic field trip is a voice, telephone conference call from one of the schools in the region to an outside authority or classroom (computers and audiographics are not used). In the past, calls have been made to Alaska, Hawaii, Georgia, Texas and many other states. Calls outside the United States have been made to England, South Africa, Australia, etc. Some of the types of individuals/groups contacted have included classrooms, city mayors, rock musicians, a computer software designer, children's book authors, university professors, etc. According to Freeman Van Wickler, "One of my major interests with distance learning has always been the electronic field trip. Rural students are so isolated and have so little, if any, cross-cultural contact. One of the major needs of rural students is [the need] to come in contact with other people in other areas. The electronic field trip is a very simple and inexpensive way to give students contact with experts in a variety of areas. Electronic field trips have been and continue to be a popular feature among BOCES schools. "

Organization Structure and Program Costs

The Executive Officer of the Delaware-Chenango BOCES is overall responsible for the operation of the Telelearning Project. Direct supervision of the project falls within the scope of the Instructional Support Services within the BOCES. This unit provides all media and other technology support to 44 schools in 18 districts. The equivalent of 1.3 full-time personnel (FTE) work with the schools to run the Telelearning Project. The Project Coordinator contributes .5 FTE to the regular operation of the project, assisted by a technology specialist who also contributes .5 FTE. Clerical work is handled by a secretary at .3 FTE. The Project Coordinator markets the program among BOCES schools, recruits and trains prospective teleteachers, coordinates all audiographic instruction among Telelearning Project member schools, and promotes and arranges electronic fields trips for schools in the BOCES area.

The BOCES acts as a service agency to all schools in its region. Services received by the schools are purchased from the BOCES. In 1988-89, 10 of the 18 districts belonged to the Telelearning Project and paid an annual fee. Since only two high school courses are presently being offered -- and these are only being shared among five schools -- several administrators have expressed concern to Telelearning Project officials that costs are too high for services received.

Coordination among schools sharing courses is very informal. Local administrators work with Teleteaching Project personnel to identify their programming needs or contact each other directly. With just two high school classes, the need for schools to contact each other has been minimal. Interest in electronic field trips, however, has remained high.

Program Costs and Funding Sources

Funds to establish and operate the Telelearning Project over the past four years have come from the following sources (Clark, 1987): Rural Resources Committee from the state legislature, $83,000; New York State Education Department, $38,500; special state legislature grant through state Senator Charles D. Cook, $30,000; U.S. Department of Education, $46,500; IBM Corporation, $5000; participating districts, $185,000; and BOCES in-kind services, $8000.

Equipment and software costs per site are about $8000. Specific equipment and software items at each site include: IBM-PC microcomputer with 640K RAM and multifunction board, high quality color graphics monitor, dot matrix printer, Optel 300 baud Voice-Too Modem, Optel Telewriter II software, Pencept Penpad (graphics tablet), Pencept "Pendraw" software (graphics creation), and a Plantronics speaker telephone. Each site must also be wired for one regular telephone connection and have access to long distance phone service. The BOCES central site houses an MicroLinx Teleconferencing Bridge. All equipment at each school site is serviced and maintained by BOCES personnel in Norwich.

Participating school districts share all operating costs associated with the Project. Each school pays a membership fee based on its school district's enrollment. The membership fee basically covers staff salaries, supplies, and equipment purchase, repair and maintenance. The fee for 1988-89 was about $5.80 per student in the district. A district of 850 enrollment, for example, pays an annual fee of about $5000 while one with 1700 students pays just over $10,000.

Total costs for high school courses are determined by dividing the actual costs of long distance toll charges and teacher's salary among the user schools, regardless of the number of students at the site. Operating costs for the 1988-89 year for the AP English course, with 13 students among three schools, were $5176. Each school pays a third of that cost in addition to its annual Telelearning Project membership fee.

All telephone calls for telecourses are initiated by the BOCES at NOrwich to member schools. This is necessary because the bridge is housed at the BOCES. Toll charges assessed to the BOCES are then passed on to the schools participating in a particular course. Electronic field trips, however, are treated differently from courses. Access to the electronic field trips is provided to all schools in the BOCES, not just to Telelearning Project members, and costs for the phone calls are paid by the BOCES from a different budget category than the telelearning classes' expenses.

Present teleteachers (AP English and AP Calculus) are both full-time teachers at schools in the BOCES service area. Teaching a telecourse is an added or over load assignment for which the teacher receives a $3240 honorarium from the BOCES.

Role and Responsibility of the BOCES and of Local Schools

Teleteachers for the high school courses are recruited and selected by Telelearning Project personnel. Part of the selection process includes a telephone interview with the Telelearning Project staff. Characteristics of good voice quality, resonance, clarity, and pitch, are reviewed carefully by BOCES personnel. They assess the candidate's skill in asking questions, oral interaction abilities, and overall voice delivery. Good verbal skills, as well as good teaching skills, are viewed as vital for success in audiographics teaching.

Local schools who join the Project are to assign a classroom facilitator to monitor the teleteaching class(s) at their school. New York state law does not mandate that the facilitator be a certified teacher. Most facilitators are teacher aides, already on staff, who are given the telelearning assignment as an added responsibility. Local schools are responsible for the salary of the classroom facilitator. Local administrators are also responsible for locating an appropriate classroom or other space for the teleteaching equipment. When a suitable site is not available, student learning can be negatively affected. For example, at one teleteaching classroom observation the teleteaching equipment was placed in a small office adjacent to the school's computer laboratory. Only one student at that site was enrolled in the teleteaching class. During instruction, the student was interrupted five different times as either other students or teachers entered the small office to get materials or supplies. Furthermore, the facilitator did not remain in the room with the student.

Teleteaching Project staff provide training in equipment and software operation for all teleteachers and for classroom facilitators at the participating schools. Training in terms of presentation, interaction, and effective teaching/learning techniques are also provided for teleteachers and classroom facilitators. Plans for the 1989-90 school year include 15 hours of skills training specifically designed for teleteachers. Teleteachers receive $15 per hour to participate.

The future of this effort requires greater participation by the districts. Marketing and coordination falls to the Project Coordinator. According to Linda Gorton, "Until now [1988-89] there has not been a continuous attempt to assess what schools want. We are trying to do that now. There has been a turn over of staff every year for the past four years. The use of the audiographics program has certainly not met its potential. We are asking schools to remain with us to help turn this around and many have been very cooperative."

Previous project coordinators have left either to pursue graduate studies or to accept other positions away from the BOCES. With the high turn over in staff, it has been difficult to maintain contact with key personnel in the schools. In the fall of 1988, superintendents, guidance counselors, principals, and other administrators in the 18 school districts of the BOCES were contacted and asked what the Teleteaching Project staff needed to do to improve its services to member districts. Seven categories were addressed: student courses, teacher inservice courses, public relations, cultivating telelearning teachers, scheduling, budgeting, and future directions. In total, over 50 suggestions were received which are being systematically addressed by Telelearning Project staff.

Among suggestions received, the BOCES is making a deliberate effort to find ways of providing "exotic" courses such as Japanese and Russian that are desired by the larger of its member school districts, which are already able to provide in-house the courses presently being offered via telelearning. Since the Telelearning Project support costs (salaries, supplies, equipment, etc.) are divided among Telelearning Project members based on average enrollment, having a few large districts in the project would reduce the membership fees for the smaller districts, allowing more of them to have access to courses they likely are unable to offer on their own.

Evaluative Data

In 1987, Cornell University conducted an in depth evaluation of the Teleteaching Project's first two years of operation. Interviews were conducted among students, teleteachers, classroom facilitators, and school administrators. Highlights of the study's findings include (Galvin, 1987):

> Most of the students and teachers interviewed agreed that the Optel audiographic equipment worked very well and was easy to use. There were some technical problems . . . Perhaps the biggest problem with the Optel computer software is the legibility of the hand written graphics.
>
> Sound transmission, which is carried by local telephone wires between classrooms in different schools, was consistently identified as a problem. .
>
> Many of the students and teachers expressed a desire for visual contact during the Telelearning courses, but it remained unclear exactly what problems would be resolved with audio-visual, or what benefits would be gained from the technology. Audiographics demonstrated itself as an adequate instructional technology in these Telelearning programs.
>
> The students who remained in the program reported that the operation of a Telelearning classroom did

> not interfere significantly with their learning. . .
>
> School administrators reported satisfaction with the Telelearning course. School district superintendents and school principals observed that the program did not complicate their administrative duties. School guidance counselors reported that scheduling differences between participating school districts were not always easily resolved and could lead to complications if a large number of Telelearning courses were offered.
>
> The role of the BOCES was described as important for the purpose of organizing the Telelearning programs, maintaining equipment, providing training for teachers and facilitating communications between interested participants. (p. 4).

Despite the criticisms raised by the Cornell study as to the poor quality of sound transmission, Telelearning staff have been unable to find a solution. Per Freeman Van Wickler, "One problem in our region is that some of the telephone lines in the outlying rural areas are antiquated phone systems. It is a fact of life that voice quality is diminished on these older systems."

Observation of students and instructors using the graphics tablet with the Optel Telewriter II software confirms that legibility of written material displayed on the computer screen can be difficult to read. This seems to be more of a technological limitation than one of skill or adeptness on the part of the user. Nevertheless, skill in using the graphics tablet for either sketching or writing notes does improve with practice.

Survey Data

A total of 18 questionnaires were returned. These included two administrators, one teleteacher, eight regular classroom teachers (teachers not directly involved with the telesystem), two facilitators and five students. Refer to Appendix B for a summation of survey results.

Responses from Administrators

The administrators reported an average school enrollment of 530 students. An average of 3 students at each site were taking one or more of the telecourses. The administrators reported spending an average of 5 or 6 hours evaluating the system during the previous semester. The administrators agreed that the quality of the tele-teaching was as good as the quality of the regular teaching. The administrators felt that the parents and the school boards in their districts were supportive of tele-teaching. On a scale of one to five, "1" being "poor" and "5" being "excellent", the administrators rated the quality of student learning via telecourses at 2.5, the overall benefit of telecourses to their schools' instructional programs at 3, and the cost effectiveness of the telecourses at 2.5.

When asked to list the strong points of the tele-learning system, the administrators listed: (a) the ability to expand curriculum offerings, and (b) the ability to offer courses for college credit. When asked to list weak points, the administrators listed: (a) poor student/teacher interaction, (b) lack of consistent instruction, and (c) the cost of the system in terms of students served.

Responses from Teleteachers

The audiographics teacher had a master's degree and 30 years of teaching experience. The teacher felt that the number of students in the tele-class was within manageable limits for effective instruction. The audiographics teacher reported spending an average of an hour and a half in preparing a daily lesson plan for an audiographics course and estimated that it took one or two days for homework to be graded and returned to the students.

The audiographics teacher normally did not receive telephone calls from the parents of students nor were the parents of students called by the teacher. The teacher felt that tele-teaching technologies would not replace regular classroom teachers. The teacher reported that students in the audiographics classes were assigned as much homework as students in regular classes and that cheating on tests and assignments occurred very infrequently. The audiographics teacher said that students at different sites frequently interacted with each other during class.

When asked to describe how an audiographics class was different from a regular class, the teacher said that the audiographics class: (a) restricted personal contact with the students, (b) provided no visual clues as to how the students were progressing, and (c) was restricted by the equipment being used.

Responses from Regular Classroom Teachers

On a five point scale where "1" was "poor" and "5" was "excellent", the regular teachers rated the quality of audiographics instruction 4.20. One of the teachers had received inservice training over the system and, using the same five point scale, rated the experience at 4.00.

The regular teachers agreed that the audiographics courses would help the students get into college. They felt that students had to work a little harder during an audiographics course than in a regular class. They did not feel that offering courses via audiographics would significantly reduce job opportunities for regular teachers.

As strong points of the telecourses, five of the eight felt that the ability to expand the schools' curriculum offerings was important. Two of the teachers said that the audiographics teachers were good instructors and that the students had the opportunity to go at a faster pace than in a regular classroom. As weak points of the system, three teachers expressed doubt as to the cost effectiveness of the system in terms of the number of students served. Two teachers felt that the classes were poorly supervised and that an inordinate amount of space was allocated to the system.

Responses from Classroom Facilitators

The facilitators had an average of one or two hours of training for their position. One of them was certified to teach in the subject being offered. They did not feel that audiographics courses were more difficult for the students than traditional courses. They said that cheating on tests or assignments occurred infrequently in the audiographics courses and that the audiographics course would help the students get into college.

When asked about the system's strong points, two of the facilitators said that it expanded the school districts' curriculum offerings. One said that the potential for interaction between schools was another positive aspect of the system. Another commented on the system being used to serve a homebound M.S. student.

The only weak point mentioned by a facilitator was that more training was needed in order for the system to reach its full potential.

Responses from Students

If given a choice between taking a regular class or taking an audiographics class, three of the students said that they would take an audiographics class. The students estimated that they asked a question or made a comment in the tele-class about 35 times per week. The audiographics teacher called on the students about 25 times per week.

Most of the students indicated that the audiographics courses were no more difficult than a regular course. When asked to list the system's strong points, three of the students said that the courses and the teachers were good. Two said that the system allowed them to receive college credit and that the classes were challenging.

As for the system's weak points, four of the students listed minor technical difficulties. Three said that the teacher was unable to see the confused looks on the students' faces. Two felt that it took too long for the homework and tests to be returned.

Plans for the Future Development

The decrease in high school programming for 1988-89, has caused concern among Teleteaching administrators. Training of teleteachers is seen as one factor that will raise the participation level among member districts. For 1989-90, AP English and AP Calculus will still be the only two high school courses offered. Both instructors are deemed to be excellent teleteachers. This is based on their ability to speak clearly and distinctly while teaching over the system. Also, for their skill in asking questions of students throughout the lesson, causing students to actively interact and participate.

For the summer (1989), a 60 hour drop-out prevention program will be offered to eighth grade students. The non-credit class is to be offered at four different sites and will involve a team teleteaching approach. Student enrollment per site has been capped at six.

Plans are also underway to offer review courses for the New York Regents exam in August 1989. Eleven hours of review are to be offered in earth science, chemistry, American history, and advanced mathematics.

BOCES is also initiating collaborative projects with colleges to bring in post-secondary courses needed by instructional staff. The first course of a three-course sequence leading to certification for coaches is planned for fall 1989 in collaboration with the State University of New York at Cortland. Also planned for fall is the first course in a program leading to a master's degree in special education being developed in collaboration with the College of Saint Rose in Albany.

Member schools have discussed the possibility of forming "pods" of schools in geographic areas to develop cooperative course offerings. The schools in the pods would be able to standardize their schedules and develop faculty expertise areas for sharing. In light of the high turnover of project personnel, Teleteaching Project staff have acknowledged the importance of maintaining close contact with member schools to assure mutual cooperation in solving perceived instructional needs.

Summary

The Telelearning Project at the Delaware-Chenango BOCES was established to help provide increased learning opportunities for students and to broaden high school offerings for small schools in the BOCES service area. At present, few students are participating in high school programming. Present administrative personnel, however, seem to recognize the program's potential and have long-term strategies in place to expand programming both in terms of credit and non-credit classes. The concept of electronic field trips has been highly praised by students and teachers, and is very inexpensive -- only the toll cost for a long distance phone call.

The fact that the project is self-supporting is one indicator that educators still see value in using the system even though current use has declined from previous years. Also, efforts by present BOCES administrators to seek input from school leaders on how the technology can best be used to meet local needs suggests that the project's potential can yet be realized.

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Appendix A

Estimate of Costs to Receive Tele-courses Via Audiographics From the Perspective of Delaware-Chanango BOCES Member Schools

Equipment and software:	4,500.00
Monthly operating costs:	575.00
Subscription fee:	5.80 times the district's average daily attendance

Personnel: Project Coordinator (half-time)
Technology Specialist (half-time)
Secretary (one third time)
Tele-teacher for each course
Facilitator for each classroom

Note: Costs vary according to the number of courses received and/or transmitted, distance between partnership sites, etc. Since many print materials are sent via fax, mail charges are minimal.

Appendix B

Results From Delaware-Chenango BOCES Questionnaires

Administrator Questionnaire
(2 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. ESTIMATE the total enrollment of your school. Avg. = 530

2. ESTIMATE how many students in your school are enrolled in audiographics courses. Avg. = 3

3. Describe the academic level of students participating in audiographics courses.
   a) mostly "A" and "B" students = 2 students
   b) mostly "C" students = 0 students
   c) mostly "D" and "F" students = 0 students
   d) all types of students = 0 students

4. How would you describe the classroom manager/facilitator of audiographics courses?
   a) certified teacher in subject area being taught = 2 facilitators
   b) certified teacher, but not in subject area being taught = 0 facilitators
   c) teacher aide = 0 facilitators
   d) volunteer = 0 facilitators
   e) other = 0 facilitators

5. ESTIMATE the number of hours you spent last semester observing the audiographics course(s) in your school. Avg. = 5.5

Based on your experience with students being taught via satellite, answer the questions below, using the following five point scale:

	Strongly Disagree 1	2	3	4	Strongly Agree 5
6. The quality of audiographics teaching in our school is as good as the quality of our regular teaching.	Avg. = 2				

7. Regular classroom teachers in our school feel their jobs are threatened by audiographics instruction. Avg. = 2.5

8. The teacher union (or state teachers' organization) in our state is supportive of the use of audiographics in our school. Avg. = 2.5

9. Parents in our district are supportive of the use of audiographics in our school. Avg. = 4

10. Our school board is supportive of the use of audiographics in our school. Avg. = 3.5

Rate each of the following items on the basis of "Poor" to "Excellent":

Don't Know	Poor				Excellent
0	1	2	3	4	5

11. Attitude of students toward audiographics courses. Avg. = 3.5

12. Attitude of students toward audiographics teachers. Avg. = 4

13. Quality of student learning achieved via audiographics. Avg. = 2.5

14. Overall attitude of teachers in your school regarding quality of courses taught via audiographics. Avg. = 3

15. Use of audio-visual aids in audiographics courses (e.g. pictures, overhead transparencies, films, videos, etc.). Avg. = 3

16. Frequency of actual teacher/student interaction in audiographics courses (that is, audiographics teacher actually addressing individual students and students verbally responding to audiographics teacher). Avg. = 3

17. Benefit of audiographics courses to your school's instructional program. Avg. = 3

18. Cost effectiveness of audiographics courses
-- that is, has the learning achieved by
students been worth the money? Avg. = 2.5

19. Do you formally evaluate the audiographics teachers in the same way you evaluate the regular teachers?
a) yes = 0 formal evaluation
b) no = 2 formal evaluation

20. What are the two or three major benefit(s) of audiographics courses for your school?

1. Ability to expand curriculum. = 1 response
2. Ability to offer college courses. = 1 response

20. What, if any, have been the major problems you've encountered?

1. Poor student-teacher interaction. = 1 response
2. Lack of consistent instruction. = 1 response
3. It is not cost effective. = 1 response

Audiographics teacher Questionnaire
(1 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. How many years have you taught school? Avg. = 30 years
2. How many years have you been teaching TV courses? Avg. = 3 years
3. Do you teach any regular classes?
   a) yes = 1 response
   b) no = 0 responses
4. What is your highest college degree? Masters = 1
5. Did you receive training for your TV teaching assignment?
   a) yes = 1 response
   b) no = 0 responses
6. How many students are enrolled in your audiographics course(s)? Avg. = 2 students
7. How many sites are there in your audiographics course(s)? Avg. = 2 sites
8. When working with the interactive teaching technology, are you able to recognize each of your students and call on them by name?
   a) yes = 1 response
   b) no = 0 responses
9. ESTIMATE what you think is the ideal class size (all sites combined) for a distance education class. Avg. = 14 students
10. At what point do you think class size (all sites combined) becomes too large? Avg. = 15 students
11. ESTIMATE how long it takes, on the average, to prepare a daily lesson for your audiographics course. Avg. = 80 minutes
12. ESTIMATE how many days it takes for students in your audiographics course to have their homework assignments/tests graded and returned to them. Avg. = 1.5 days

13. For a typical audiographics course, ESTIMATE the number of telephone calls you receive from parents of students during an average semester.
Avg. = 0 calls

14. For a typical audiographics course ESTIMATE the number of telephone calls you initiate to parents of students during an average semester.
Avg. = 0 calls

15. Is your audiographics teaching formally evaluated by school principals (or other administrators) at distant site locations?
a) yes = 0 responses
b) no = 1 response

16. Is your audiographics course(s) mostly geared for
a) remedial students? = 0 students
b) average students? = 0 students
c) advanced students? = 1 student
d) mixture of all of these = 0 students

17. Do you receive a higher salary for teaching audiographics courses than you would if you taught in a regular classroom?
a) yes = 1 response
b) no = 0 responses

18. Do you have a reduced teaching load, as compared to a regular teacher, because you are an audiographics teacher?
a) yes = 0 responses
b) no = 1 response

19. What are the THREE most important ways that audiographics teaching is different from regular classroom teaching?

1. There is no personal contact. = 1 response
2. There are no visual cues. = 1 response
3. The equipment restricts the teacher. = 1 response

Answer the questions below, based on the following five point scale:

Strongly Disagree — Strongly Agree
1 2 3 4 5

20. Audiographics technologies will replace regular classroom teachers.
Avg. = 1

21. Preparing lesson materials for delivery via audiographics technologies is much more time consuming than preparing lessons for regular teaching.
Avg. = 4

22. Students in my audiographics course(s) are assigned as much homework as students in regular classes. Avg. = 5

23. Student cheating on tests or assignments occurs very infrequently in my audiographics course(s). Avg. = 5

24. Students at different sites frequently interact (exchange questions, comments, or otherwise talk back and forth with each other) during my audiographics course(s). Avg. = 5

Regular Teacher Questionnaire
(8 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you aware that "distance education" courses are being taught in your school?
   a) yes = 8 responses
   b) no = 0 responses

2. Have you ever observed the distance education class(s)?
   a) yes = 6 responses
   b) no = 2 responses

   If yes, how would you rate the quality of instruction provided students (on a 5 point scale where "1" is "poor" and "5" is "excellent")? Avg. = 4

3. Have you taken any inservice training courses at your school that have been presented in a "distance education" delivery mode?
   a) yes = 1 response
   b) no = 7 responses

   If yes, a) ESTIMATE the number of courses. Avg. = 1 course

   b) Rate the quality of training presented (on a 5 point scale where "1" is "poor" and "5" is "excellent") Avg. = 4

   c) Did you interact with the audiographics teacher during a course?
      a) yes = 0 responses
      b) no = 1 response

   d) Did you interact with other teachers at your site during a course?
      a) yes = 1 response
      b) no = 0 responses

   e) Did you interact with other teachers at other sites during a course?
      a) yes = 1 response
      b) no = 0 responses

4. Which type of inservice classes do you prefer?
   a) traditional inservice with an on-site trainer/instructor = 4
   b) training delivered via one-way audiographics. = 0

5. During a typical inservice training program presented over your school's audiographics system, ESTIMATE the number of actual trainer/teacher interactions that actually occur. Avg. = 3

Based on your knowledge of TV courses offered to students at your school, answer the questions below, using the following five point scale:

Don't Know	Strongly Disagree				Strongly Agree
0	1	2	3	4	5

6. Audiographics courses appear to be more difficult than traditional courses. Avg. = 3.57

7. Students would do better in a traditional setting. Avg. = 3.33

8. Students would rather take a audiographics course than a course in a traditional setting. Avg. = 2.25

9. The audiographics teacher seems to be personable with students (seems to convey a feeling of caring about students). Avg. = 3.4

10. The audiographics courses will help students at our school get into college. Avg. = 3.5

11. Students typically have to work harder during a audiographics course than in regular classes. Avg. = 3.67

12. Only certain students at this school are allowed to take a audiographics course. Avg. = 3.5

13. Offering courses via audiographics will significantly reduce job opportunities for regular classroom teachers. Avg. = 2.33

14. Would you like to teach a audiographics course?
   a) yes = 5 responses
   b) no = 3 responses

15. What are the two or three major strong points of the audiographics teaching in your school?

    1. Ability to expand the curriculum. = 5 responses
    2. Students can go at a faster pace. = 2 responses
    3. Provides access to good teachers. = 2 responses

16. What are the two or three major weak points of the satellite teaching in your school?

    1. May not be cost effective. = 3 responses
    2. The students are poorly supervised. = 2 responses
    3. The space could be used better elsewhere. = 2 responses

17. ESTIMATE the number of times you have observed instruction on the audiographics system in your school. Avg. = 8 times

Facilitator Questionnaire
(2 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you certified to teach in the subject being offered?
    a) yes = 1 response
    b) no = 1 response

2. How many audiographics courses do you oversee? Avg. = 1 courses

3. Are audiographics courses at your school mostly geared for
    a) remedial students? = 0 students
    b) average students? = 1 student
    c) advanced students? = 1 student
    d) other? = 0 students

4. Is the audiographics system used for teacher in-service training?
    a) yes = 0 responses
    b) no = 2 responses

5. ESTIMATE the total number of hours you spent training for your tasks in the audiographics classroom. Avg. = 1.5 hours

6. ESTIMATE the total number of times students in an average audiographics class talk to the audiographics teacher each week. Avg. = 20 times

7. ESTIMATE the average number of students in a audiographics class at your site. Avg. = 3 students

8. ESTIMATE the average number of students in an entire audiographics class (including all sites). Avg. = 8 students

Answer the questions below, based on the following five point scale:

	Strongly Disagree 1	2	3	4	Strongly Agree 5
9. Audiographics courses appear to be more difficult than traditional courses.	Avg. = 3				

10. Students would do better in a traditional setting. Avg. = 2.5
11. Students would rather take a audiographics course than a regular course. Avg. = 3
12. The audiographics teacher seems as knowledgeable as the regular teachers in this school. Avg. = 5
13. I can easily contact the audiographics teacher if I need to. Avg. = 5
14. The audiographics course will help students get into college. Avg. = 4
15. Students have to work harder during an audiographics course. Avg. = 2.5
16. Only certain students at this school are allowed to take an audiographics course. Avg. = 3
17. Homework assignments are returned to the audiographics students more slowly than to the regular students. Avg. = 2.5
18. The audiographics teacher can recognize the students' voices and call them by name. Avg. = 5
19. The audiographics teacher asks more questions than a regular teacher would. Avg. = 4
20. Student cheating on tests or assignments occurs very infrequently in this audiographics course. Avg. = 3

19. What are the system's strong points?

   1. Ability to expand the curriculum. = 2 responses
   2. Ability to interact with others. = 1 response
   3. M.S. student can use the system at home. = 1 response

20. What are the system's weak points?

   1. Need more training to reach the system's full potential. = 1 response

Student Questionnaire
(5 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. What year are you in school?
   - a) 9th grade = 0 students
   - b) 10th grade = 0 students
   - c) 11th grade = 1 student
   - d) 12th grade = 4 students
   - e) other (explain) = 0 students

2. ESTIMATE your grade point average for the past three years.
   - a) "A" student = 2 students
   - b) "B" student = 3 students
   - c) "C" student = 0 students
   - d) "D" student = 0 students

3. If you had a choice between enrolling in a audiographics course or taking the same course in a regular classroom, which would you choose?
   - a) regular class = 2 responses
   - b) audiographics class = 3 responses

4. Are you taking this course for Advanced Placement?
   - a) yes = 4 responses
   - b) no = 1 response

5. How many audiographics courses are you enrolled in? Avg. = 1 course

Answer questions 6, 7, 8, 9 and 10 for your most enjoyable audiographics course. (If you are enrolled in only one course, then answer for that course.)

6. ESTIMATE the number of times during the last week that you contacted your audiographics teacher. Avg. = 32 times

7. ESTIMATE the number of times during the last week that your audiographics teacher contacted you. Avg. = 25 times

8. Is this class an elective or is it required?
    a) elective = 5 responses
    b) required = 0 responses

9. How many students are in the class at your site? Avg. = 3 students

10. ESTIMATE the number of students in the entire class (including all sites). Avg. = 8 students

Answer the questions below, based on the following five point scale:

Don't Know	Strongly Disagree				Strongly Agree
0	1	2	3	4	5

11. Audiographics courses are more difficult than regular classes taught in school. Avg. = 2.4

12. I could make a better grade if the course was taught in a regular setting. Avg. = 1.4

13. I've gotten to know the students in my audiographics course as well as the students in my regular classes, even though my audiographics classmates are farther away. Avg. = 2.8

14. I work more closely with the students in my on site audiographics class than with students in my regular classes. Avg. = 4.2

15. My audiographics teacher is as friendly to me as most regular teachers in my school. Avg. = 5

16. I can easily contact the audiographics teacher to ask questions or make comments if I want to. Avg. = 4.6

17. The audiographics course(s) I am taking will help me get into college. Avg. = 3.2

18. I have to work harder in my audiographics course than I do during a regular class. Avg. = 3

19. Only certain students at my school get to take a audiographics course. Avg. = 3.2

20. Homework assignments are returned more slowly in audiographics courses than they are in most of my regular classes. Avg. = 4

21. The audiographics teacher knows all of the students at my site by name. Avg. = 5

22. The audiographics teacher asks more questions during class than most regular teachers do. Avg. = 4.4

23. What are the three best things about a audiographics course?

1. Good course and teachers. = 3 responses
2. Ability to receive college credit. = 2 responses
3. Challenging experience. = 2 responses

24. What are the three worst things about a audiographics course?

1. Minor technical problems. = 4 responses
2. Teacher cannot see confused students. = 3 responses
3. Slow homework return. = 2 responses

Appendix C

Information contained in this case study was obtained via printed materials supplied by administrators from the Teleteaching Project at the Delaware-Chenango BOCES, Norwich, New York; from survey data mailed to each of the participating schools and return from them in March 1989; and from on-site interviews and class observations with the following individuals on the dates listed below:

March 13, 1989

Freeman Van Wickler
Executive Officer
Delaware-Chenango BOCES
R.D. #3
Norwich, New York

Linda Gorton
Teleteaching Project Coordinator
Instructional Support Services
Delaware-Chenango BOCES
2 North Mitchell Street
Norwich, New York

Elaine Lull
Classroom Facilitator
New Berlin Central School
New Berlin, New York

Audiographics AP English Students (4 students)
New Berlin Central School
New Berlin, New York

March 14, 1989

Bonnie Cotell
Computer Teacher
Afton Central School
Afton, New York

AP Audiographics Calculus Student (only one at Afton School)
Afton Central School
Afton, New York

Revised Copy
June 1989

THE PENNSYLVANIA TELETEACHING PROJECT WITH A FOCUS ON DANSVILLE SCHOOL DISTRICT'S PARTICIPATION IN THE PROJECT WITH ST. JOSEPH'S CATHOLIC SCHOOL AND THE NORTH CENTRAL SECURE TREATMENT UNIT IN DANSVILLE, PENNSYLVANIA

The Pennsylvania Teleteaching Project

Background Information

The Pennsylvania Teleteaching Project (PTP) is a statewide audiographics network, using standard telephone lines, formally established in the Commonwealth of Pennsylvania in 1986 to provide increased educational opportunities for students attending small high schools with limited curriculum offerings. This case study provides a brief description of the PTP and outlines the rationale behind its establishment. One of the participating members of the project, Dansville School District is highlighted for its partnership in delivering course work to a private parochial school and with a state operated juvenile correction facility. The first 12 pages of this case study describe the PTP. The remaining pages discuss Dansville School District's involvement with the PTP.

Brief History of the Pennsylvania Teleteaching Project

The search for alternatives to better educate students denied access to a full range of curriculum offerings motivated the Pennsylvania Department of Education (PDE) to look to telecommunications as a possible solution. According to Joseph Bard, Chief Project Officer, PDE and administrative link to the PTP:

> The problem was (and is) that many students in the State do not have the opportunity to take courses necessary for the completion of their educational program by the traditional method, i.e., students and teachers in the same classroom at the same time, in the same place. For a variety of reasons, this is not always possible and the result is the disenfranchisement of the child so denied. (Pennsylvania Teleteaching Project, p. 15)

The use of telecommunications technologies was seen as a promising instructional technique that could be used to broaden curriculum opportunities for students. The PDE established the following criteria in their examination of distance education alternatives (The Pennsylvania Teleteaching Project, p. 15):

- Allows for learning at a high level
- Can be used in a wide variety of learning environments with varying numbers of students
- Is as cost effective as current technology allows

Actual development of the PTP goes back to 1984, when Dennis Wydra, a professor of education at Mansfield University attended the "Building Partnerships for Quality Education in Rural America Conference" in Washington, D.C. sponsored by the U.S. Department of Education. At the conference, Wydra met Henry Jolley, a school superintendent from southeastern Utah who had been instrumental in designing and establishing a computer-based distance delivery system using regular telephone lines in southern Utah. The system used Apple II microcomputers, light pens, modems and speaker telephones and had been successfully used to simultaneously teach a high school trigonometry course originating from Dixie College in southern Utah to three separate high schools some 150 miles distant. Interested in field testing the Utah audiographics model in Pennsylvania, Wydra received $47,000 from the PDE for the 1985-86 school year to operate a pilot project among five schools in the Southern Tioga School district located in the north eastern mountains of the state. The project targeted three distinct populations: college-bound high school students, educable mentally retarded students, and elementary school students. The pilot project demonstrated to the PDE that audiographics technology could be successfully used with different types of learners at varying age levels. The PDE agreed to allocate $526,000 to fund a statewide audiographics systems for 1986-87 with Wydra appointed as the project director (Gilcher and Johnstone, 1988; Wydra, 1987a).

Growth of the Pennsylvania Teleteaching Project

For the 1986-87 school year, funds from the PDE provided 29 school districts and intermediate units (education service centers) and two juvenile detention centers with audiographics teleteaching equipment and software. By the end of the year, the schools had shared 19 different courses and served over 200 students. For 1987-88, 32 schools comprised the network, and in 1988-89 it had grown to 48 schools. Over the last three years, approximately 1600 students have taken teleteaching courses. Appendix A provides a schematic of PTP teleteaching sites at the end of 1988.

Administration of the Pennsylvania Teleteaching Project

In its start-up year (1986-87), the Project was managed from Mansfield University by Dennis Wydra. In the fall of 1987, Wydra took a one year sabbatical from the university. At that time, PDE assigned operational responsibility to Riverview Intermediate Unit (IU). Administrators at Riverview had previously expressed interest in managing the project. The IU also had a history of serving rural school districts in Pennsylvania. Since 1987, Riverview IU has maintained the responsibility to manage the PTP. Mansfield University continues as one of the Project's 48 teleteaching sites.

Riverview IU is one of 29 intermediate units in Pennsylvania. Management of the PTP falls to the Project Director and the Administrative Liaison. Riverview maintains a library of lessons (computer disks) that have been used by teachers on the system. PTP administrators are responsible for coordinating the entire Project, selecting new schools to join the Project, training teleteachers, purchasing and setting up hardware, communicating design needs to software providers, matching schools' curriculum needs with trained teleteachers, maintaining equipment, etc.

The PTP's model for audiographic teleteaching is usually a joint arrangement between two to three school districts to form a partnership to share teachers and courses. Of the 48 schools participating in the Project, no partnership for course sharing exceeds three member schools at one time. According to Dorthy Hajdu, administrative liaison with the Riverview IU and state coordinator for the PTP, this is one of the Project's strengths: "Due to the collaborative arrangements of two or three schools linked together the local districts maintain control of the teleteacher, programming, and scheduling. We also try to keep class size small. State guidelines allow classes to be no larger than 30 students, regardless of the number of sites joined together. Classes in the Project average around 15 students. In most cases, this is between two schools."

Furthermore, it is not unusual for a school to be a member of more than one partnership. And, for mergers between schools to be formed on an ad-hoc basis to meet curriculum needs between schools, then dissolve once those needs have been met. Because the network is linked by regular telephone lines for both the speaker telephones and the microcomputers, different schools can join together to teach a specific course, then dissolve their relationship after the course has been taught. Connecting both video and audio lines between schools is simply completed by dialing each schools' telephone number. The ease of linking together has promoted a great deal of cooperation between schools. According to Gary Neights, who served as PDE technical liaison to the PTP during its first two years of operation, "The ease of forming and dissolving partnerships, on an as needed basis, to accomplish mutual benefits has allowed participating schools anywhere within the state -- and even beyond state boundaries -- to join together to share resources."

Description of Technology used in the Pennsylvania Teleteaching Project

Audiographics is a PC-based system which incorporates computer generated graphics that function much like an electronic chalkboard. The system requires specially designed telecommunications software that is available for Apple and MS-DOS microcomputers. The software lets the user create computer text/graphics known as "slides" which are transmitted from one computer to another. Once on-line with other compatible PC's, the system operates on a "common screen" basis -- that is, whatever graphic or textual material (slide) is presented from the host screen/monitor automatically shows up on all the other screens at the distant locations simultaneously. The distance between computers may be across the room or across the country. It does not matter.

Slides created with the graphics software are saved on floppy disks as "slide shows." The disk for each slide show must be at both the host site and at the receive site in order to be displayed simultaneously. The slides are made on the "host" computer, saved to disk, then a copy of the disk must be made and is either mailed or downloaded to the receive site school. Slide shows must be prepared in sufficient time to allow for delivery from host to receive site classroom. As a result, teleteacher lessons must be pre-planned and prepared.

The visuals exchanged between computers are still-frame. Motion is not possible. Computers are linked over regular telephone lines for two-way visual exchange of computer generated text and/or graphics.

Two-way audio interaction between the teacher and students at distance sites is via a speaker telephone, also over regular telephone lines. Students at distance sites may speak with their teacher, or with other students at different sites, at any time to ask questions or make comments. Most schools participating on the Project use two separate telephone lines -- one for voice and one for data. A very few have voice/data modems which operate on a single telephone line, but require manual switching each time information being sent changes from voice to data. The preference has been to use two lines.

Equipment/Software Requirements for Pennsylvania Teleteaching Project

The audiographics system operates on either Apple IIe or MS-DOS microcomputers. The majority of the sites (over 90% according to Dorthy Hajdu) use MS-DOS equipment. Most users have recommended MS-DOS machines as faster and capable of better graphics than Apple IIe machines. Equipment at each site on the project can serve in both a transmit mode to send lessons or in a receive mode.

Basic equipment items at each site, as provided through the Riverview IU include: an MS-DOS microcomputer, a Plantronics Phonebeam speaker telephone, a Hewlett Packard dot matrix printer, either a light pen or a mouse for graphics input (local districts select which device they prefer), a Hayes compatible modem (MS-DOS machines use a 2400 baud and Apple IIe machines use a 1200 baud). A few sites

(10) have facsimile machines.

The software used by the PTP functions in (1) a telecommunications mode to network computers together via modems, and (2) a graphics production mode to create graphics and text that can later be transferred between computers at distant sites. The software used in the first year of the Project was developed by programmers of Technical Services National in Tampa, Florida and was produced by Mansfield University. The software has since undergone several upgrades resulting in increased functions for slide development and ease of use for students and teleteachers. At the beginning of the 1988 school year, Riverview IU provided each participating school with TSN's Computer Aided Teaching System (CATS) software. The CATS package allows creation of text/graphics in 4 palette colors and 16 background colors. It also provides drawing functions, geometrical shapes functions, a pointer, several different brush strokes for drawing and lettering, rubber-banding features while making geometric shapes, several different font sizes, special fonts for foreign languages, etc. Control between the "host" computer and the "receive" computer can be passed from one machine to the other at any time. The original software programers have since formed their own company and moved it to Pennsylvania (TSN Systems, Boiling Springs, Pennsylvania) where they work closely with PTP administrators at Riverview IU and with the PDE.

Pennsylvania Teleteaching Project Costs and Funding Sources

Monies to finance the PTP have come from the Pennsylvania Department of Education as noted in Figure 1 below:

Figure 1

Year	Amount	Recipient
1985-86	$ 47,000	Mansfield University
1986-87	$526,000	Mansfield University
1987-88	$276,000	Riverview Intermediate Unit
1988-89	$103,000	Riverview Intermediate Unit

Support for 1985-86 was to fund the pilot project. The next year was to formally establish the Project. Monies in subsequent years have been used to expand the Project, provide inservice training for teleteachers, upgrade software and equipment at existing sites, and for program maintenance.

TSN Systems, in 1988, provided the CATS software to each site at a state cost of $350 per site. During the 1988-89 year, Riverview IU established six PTP support sites at six other intermediate units geographically spread throughout the sate. Per Dorthy Hajdu, "We wanted to give teleteachers as much hands on and individual help that we could. By having people trained throughout the state [at other intermediate units] to work with teleteaching, we have been able to set up experts across the state to help train teleteachers, maintain equipment, and trouble shoot as needed."

Virtually all member schools in the Project have been provided with equipment and software. A few schools purchased equipment on their own. PTP administrators at Riverview IU estimate total equipment costs per site at about $5000. Local schools pay their own long distance telephone bills which vary between cooperating schools, depending on distances between sites. Appendix B presents a breakdown to member school of estimated costs to participate on the PTP.

Program Offerings Pennsylvania Teleteaching Project

Specific course offerings are determined by each individual partnership. A variety of courses have been taught among cooperating schools including a Spanish language course originating from Juarez, Mexico to high school students at Venango Christian High School in Oil City, Pennsylvania. Fifteen students have participated in the course which began in February of 1988. Sebastian Rubino, instructor at Venango Christian High School said (Pennsylvania Teleteaching Project Newsletter, 1988, p. 2), "The students really enjoy coming to class and constantly comment on how time flies during the lesson. To me, that's a good sign of real interest and a successful class and, after all, that's what teaching is all about." Courses have also been exchanged with schools in Utah and South Dakota.

Appendix C provides a lists of courses taught between sending and receiving schools for the 1988-89 school year.

Selecting Teleteachers for the Pennsylvania Teleteaching Project

Guidelines for the selection and training of teleteachers, approved by the PDE, were prepared in 1986 and updated in 1988. Appendix D provides a detailed listing of professional guidelines for selecting, compensating, and training teachers involved with the PTP.

The teleteacher is responsible to plan lessons, make slides, and teach teleclasses. All slides for lessons must be made in advance, copied to a floppy disk, then mailed to the classroom facilitator at the receive site. Exchange of materials (handouts, student homework assignments, etc.) for grading is typically via the mail.

Classroom facilitators or associate teleteachers, as they are called by PTP officials, are required to supervise students in each receive classroom. Because of the state's teacher union policy, all associate teleteachers in Pennsylvania must be certified classroom teachers. The associate teleteacher is the "eyes and the ears of the teleteacher." They are responsible to encourage students to participate and interact with the teleteacher, maintain discipline, and assist students in understanding the lesson material. They also receive the floppy disk slide shows from the teleteacher and load them onto the hard disk of their school's computer or insert into the appropriate computer drive of the computer does not have a hard disk.

Evaluation of teleteachers is determined between administrators at participating schools. Also, local districts are responsible to pay teleteachers and associate teleteachers.

Dansville School District, St. Joseph's Catholic School, and the North Central Secure Treatment Unit: Examples of Teleteaching Partnerships

Educational Context and Community Served

Dansville School District enrolls approximately 2700 students spread among four elementary (grades 1-5) schools, one middle school (grades 6-8), and one high school (grades 9-12). Dansville is the county seat for Montour County, centrally located in the Sequehanna Valley of eastern Pennsylvania. The area around the district is chiefly agricultural but is also known for its health care and manufacturing industries.

Although the typical model in the Pennsylvania Teleteaching Project is usually for two sites to be linked together to deliver one or two courses, it is not unusual, as is the case with Dansville School District, for a school to be a member of more than one partnership.

In 1986, Dansville was one of 29 sites selected to participate in the first year of the Pennsylvania Teleteaching Project (Ferrari and Keifer, 1988). Since then the district has used audiographics to link with St. Joseph's Catholic School, a private parochial school to provide Chapter I remedial reading. The district's high school has also delivered selected classes to the North Central Secure Treatment Unit (NCSTU), a state run juvenile detention center about three miles away. The NCSTU has received courses from two other school districts, one about 20 miles distant and another about 90 miles away. In addition, the NCSTU has delivered courses to a sister correctional institution.

The NCSTU is a maximum security facility operated by the Pennsylvania Department of Public Welfare for serious juvenile offenders. It is a 24 hour lock-up facility which has a rated capacity of 28 male inmates who typically range in age from 14-18. Most inmates have been incarcerated either as a result of repeated attempts to run away from less restrictive juvenile detention facilities, or because they have committed multiple offenses such a burglary, auto theft, or larceny. Almost all inmates are guilty of felonies. Several have committed homicides. The young men housed at the Secure Unit are racially mixed, 40-50% are either Black or Hispanic. The NCSTU is the last step in the state's juvenile justice system. The next step is the state prison.

Sharing of Courses between Dansville and St. Joseph's

Dansville School District provides Chapter I services to St. Joseph's Catholic School. Federal regulations prohibit public schools from providing instruction on the premises of a parochial school. Through the Central Sequehanna Intermediate Unit, Dansville has access to a mobile classroom van. The district's reading specialist had been using the van twice weekly to provide instruction to Chapter I students in the parking lot adjacent to St. Joseph's School. Beginning in the Fall of 1988, administrators at Dansville district and the principal of St. Joseph's agreed to pilot audiographics as a another alternative to provide the needed remedial reading program. The reading specialist delivers 45 minutes of tutoring one day per week electronically to the students in the school, while the second day of services is provided in person in the van on the school's parking lot. Six fourth grade students have been served in this manner since the program's inception. The reading specialist teaches from a work station in Mahoning Elementary School about one and one-half miles away from St. Joseph. The work station at Mahoning as well as the remote classroom at St. Joseph's is equipped with a dual floppy Apple IIe microcomputer, one 1200 baud modem, a dot matrix printer, a Phone Beam speaker telephone, and two regular dial-tone telephone lines. When the Chapter I students are receiving their lessons via audiographics, the school principal serves as the associate teleteacher.

Administrators at St. Joseph's and at Dansville agree that having a reading specialist on-site, face-to-face, remains the ideal way to achieve Chapter I program objectives. Nevertheless, given Federal restrictions, the audiographics approach has proven effective. According to Barbara Fleming, the Chapter I instructor, "The technique [audiographics] seems to lend itself to vocabulary phonetic skills. The students have viewed the lesson more as an experience to work with the computer than as a remedial or 'catch-up' program." On the day when students enter the van for face-to-face instruction, more in depth and more interactive techniques are used.

Sharing of Courses between Dansville School District and the NCSTU

Since 1979, the Dansville School District, under contract to the Pennsylvania State Department of Educations Correction, has provided middle school and high school level instruction to each of the inmates at the NCSTU.

Six classroom teachers serve full-time at NCSTU. Traditional classes are offered in mathematics, vocational education, social studies, English and language arts, and in job training. When Dansville High School joined the

Pennsylvania Teleteaching Project in 1986, district administrators expressed interest in teaching via audiographics to the NCSTU in order to expand curricular offering without adding additional staff to the facility. A partnership between corrections education and teleteaching seemed ideal.

Since 1986, a one semester computer education class has also been taught each year to the facility. The class originates live from Dansville High School, about two miles from North Central. Students in the high school class have become acquainted with young men at NCSTU. As part of a word processing assignment, students in the high school class and those in the Secure Treatment Unit class have exchanged letters between one another. The high school teacher has separately videotaped both the incarcerated students at NCSTU and the high school students then exchanged videotapes so that students at each site could become better acquainted with their distant classmates.

Dansville High School and the NCSTU are both original members of the PTP. Equipment and software were provided by the Project. The high school and the NCSTU both pay for the monthly phone charges (two lines at each site) which are about $45 per site. There are no toll charges between the high school and the secure treatment unit.

Sharing of Courses between NCSTU and other Institutions

Not all audiographics classes to NCSTU have originated from Dansville High School. Sullivan High School, about 20 miles away from the NCSTU taught a remedial health education class in 1986. The class was taught live to six educable mentally retarded students at Sullivan at the same time it was sent to seven students at the NCSTU.

In the Fall of 1988, a computer aided drafting course (CAD), was introduced at the NCSTU. The course originates from Mansfield High School, 90 miles north of Dansville. Unlike most other audiographic classes which are delivered five days per week, the CAD class is received only two days per week at the NCSTU. The other three days of the week, students are allowed time to work on their extensive homework assignments. One side benefit that has resulted from receiving the CAD course delivered by Mansfield high school has been the new skills and knowledge acquired by the class associate teleteacher. The CAD associate teleteacher at North Central has been interested in learning more about CAD and after each telelesson received from Mansfield, he then studies the material and modifies the same lesson which he then teleteaches to five students at Dansville High School. In this case, instruction originates from the NCSTU to Dansville High School.

Finally, the Job Training Partnership Act teacher at NCSTU has worked with teachers at the Loysville Youth Development Center, a sister institution to North Central located some 60 miles from Dansville. North Central and Loysville have joined together to provide instruction in life skills, job training, drug abuse, etc. Administrators between the two juvenile correctional facilities have worked together to trade mini-courses that have run from three to four weeks, two to three times per week. Mini-courses which have been taught include life skills training, job training, drug abuse, parenting skills, etc. Because of the common missions shared by the NCSTU and Loysville, it is expected that the partnership between the two institutions will be further developed.

The long distance telephone charges between Mansfield High School and the secure treatment unit costs about $18.00 per hour for two lines. Costs are paid by the receiving school (in this case, NCSTU). Mansfield High School does not assess any cost to NCSTU for their high school CAD teacher, who teaches the same class live to his students. The long distance telephone costs between the NCSTU and Loysville run about $9.00 per hour for two lines. These are paid by the receiving school.

Evaluative Data: Pennsylvania Teleteaching Project

Participant response by both students and school administrators to the PTP's first year of operation were very positive (Wydra, 1987b) with some teleteachers reporting that students in remote site locations received higher grades that students taught in their live classes on site.

An evaluation conducted by researchers at the Rural Services Institute at Mansfield University (Murray and Heil, 1987) noted positive aspects of the Project which included: it gave students an opportunity to receive instruction in a subject area that would not have been available to them; students developed new learning skills, and many became "active" learners, not just passively receiving information; increased communication skills, including listening, oral expression, and assertiveness were developed by students; students met (via the phone connections) "strangers" and began working with them in a mutual educational endeavor; and many students acquired enhanced self-esteem and improved self confidence while in audiographic classes.

Murray and Heil (1987) also made several recommendations, some of which included:

> A key to teleteaching is team teaching. The relationship between the teleteaching and associate teleteacher is critical. MOre attention can be given to this relationship and the roles of each team member. . . It is important to develop the notion of team work and to ensure the best use of both team members' talents.

> Preparation time, prior to beginning the course is important, especially for the teleteachers. This advance preparation needs to include adequate exposure to and training on the equipment and software and assistance with defining appropriate use of the system in their course. . . Some teachers, and associate teachers, may also require training in the area of communication skills, especially in regard to maximally encouraging the receiving site students to participate in their learning and to become more verbally engaged with the teleteachers.
>
> Where special populations are involved, particularly residentially segregated groups as in a detention facility, special attention needs to be given to bridging the gap between students at the different sites. Social and situational barriers should be addressed with a specific plan to address the needs and feelings of both groups involved.
>
> Careful attention to linking students at different sites is also necessary. In addition to planned visits where students can meet each other face-to-face, teachers should be encouraged to incorporate some regular brief personalizing dialogue between students at different sites. Where this has been done, a better learning atmosphere seems to develop. (p. 3-4)

An evaluation conducted at the end of the 1987-88 school year by Research for Better Schools, Incorporated has been highly supportive of the Project (Dusewicz and Patrick, 1988). The researchers surveyed 21 school administrators, 38 teleteachers, and 242 students. On a five point Likert scale, students and administrators agreed with statements asking if teleteaching offered courses which otherwise would not be available in their school. Mean responses were 4.05 and 4.20, respectively. When asked if teleteaching was as effective as classroom instruction, the mean response from administrators was 3.90. Their mean response was 3.95 regarding personal satisfaction with the instructional outcomes for teleteaching courses in their school.

The Research for Better Schools study reported that the average cost of audiographics courses in Pennsylvania is approximately $93.00 per student, which is still higher than the cost for traditional, on-site instruction. This cost was based on the prevalent use of two telephone lines to conduct courses between sending and receiving classrooms.

Evaluative Data: Dansville, NCSTU, and St. Joseph Catholic School Partnerships

Inasmuch as most partnerships, such as those described in this report, are made up of only 2-3 schools, there is usually no problem is bell scheduling, school holiday periods, or grade report periods. Local control of teleteachers, curriculum content, selection of students for telecourses, etc. were all identified as positive features of audiographics by administrators at Dansville, St. Joseph's, and the NCSTU.

Jim Gerdy, headmaster of the North Central Secure Treatment Unit stated, "I see lots of benefits to our kind of student that have been spin-offs from teleteaching. Study skills have improved, competition between our students and students at Dansville High School has been positive. Our kids want to show that they can compete at the same level as regular school students and minimize the image of being a criminal. Our students note taking skills have improved. They listen very attentively to the telephone. [They] don't want to miss anything. We find them better behaved than in our regular classes at the facility."

Students interviewed at the NCSTU reported that they liked teleteaching. One young man said that he paid more attention during his teleteaching classes, because if he didn't listen carefully he would miss the material. He also commented that he took more notes and that note taking was easier because the slides on the computer monitor displayed important material for him to copy down. He indicated that he wanted to prepare for a career in computer programming. According to Jim Gerdy, some of the students have prepared some of the audiographic slides on drug and alcohol abuse that were delivered to Loysville Youth Development Center. One student who was an inmate at the NCSTU three years ago and who completed the computer science teleteaching class delivered from Dansville High School is now enrolled at Oklahoma State University.

Survey Data

Only data collected from Dansville High School and the North Central Secure Treatment Unit is reported in this case study. A total of 18 questionnaires were returned. These included one administrator, five audiographics teleteachers, eight regular classroom teachers (teachers not directly involved with the Project), two facilitators and five students.

Responses From Administrators

Most of the 28 students in the audiographics courses were "C" students. The administrator felt that the quality of the audiographics teaching was as good as the quality of the regular teaching. He felt that the school board was supportive of the use of audiographics teaching. On a scale of "1" equals "poor" to "5" equals "excellent", the administrator rated the quality of student learning via audiographics courses at "4". The administrator indicated that the teacher-student interaction rated a "4", and that audiographics courses were cost effective in terms of student learning.

When asked to list the strong points of the audiographics system, the administrator listed: (a) expanded curriculum offerings, and (b) the ability to network with the school district. When asked to list weak points of the audiographics system, the administrator expressed concern over schedule coordination and minor technical difficulties.

Responses From Audiographics Teachers

The audiographics teachers felt that the number of students in their audiographics classes was within manageable limits for effective instruction. They spent an average of an hour and ten minutes in preparing a daily lesson plan for an audiographics course and estimated that it took four to seven days for homework to be graded and returned to the students. Most of the audiographics teachers did not feel that audiographics teaching technologies would replace regular classroom teachers. They reported that students in their classes were assigned as much homework as students in regular classes and that cheating on tests and assignments was infrequent. The audiographics teachers said that students at different sites did not interact with each other very much during the audiographics course.

When asked to describe how an audiographics class was different from a regular class, two of the audiographics teachers said that the audiographics class required better preparation and that more responsibility was placed upon the students. Another teacher commented that the classes were more structured and restricted the number of teaching strategies that could be used. One teacher said that there was not enough control over the distant class sites and that there was no eye contact with the other classes.

Responses From Regular Teachers

All of the teachers who responded to the questionnaire were aware that distance education courses were being taught in their school. On a five point scale where "1" was "poor" and "5" was "excellent", the regular teachers rated the quality of instruction at 3.80. Two of the teachers who had received inservice training over the system rated the experience at 4.50. The regular teachers did not feel that offering courses via audiographics teaching would reduce job opportunities for regular classroom teachers.

When asked to list the strong points of the audiographics courses, three of the regular teachers felt that the ability to expand the schools' curriculum offerings was important. Another teacher said that the system exposed the students to good teachers and that it provided a certain amount of individualized instruction.

As weak points of the system, three of the regular teachers felt that coordinating the schedules of the participating schools presented problems. Two of the teachers said that there were minor technical difficulties and that more teacher prep time was required for an audiographics class.

Findings From Facilitators

Neither of the two facilitators in the study were certified to teach the subject being offered. They had an average of three hours of training for their position. They did not feel that audiographics courses were more difficult for the students than traditional courses, but felt that the students would do better in a traditional class. They reported that they could easily contact the audiographics teacher if the need should arise and that cheating on tests or assignments occurred very infrequently.

When asked about the system's strong points, the facilitators said that it expanded the school districts' curriculum offerings, and that it improved the students' study skills. As for the system's weak points, the facilitators included minor technical difficulties and the lack of personal contact between the teacher the students.

Findings From Students

If given a choice between taking a regular class or taking an audiographics class, ten of the students said that they would take an audiographics class. The students estimated that they asked a question or made a comment in the audiographics class about six times per week, and that the audiographics teacher called on the students about six or seven times per week. Most of the students indicated that the audiographics courses were no more difficult than a regular course and that the audiographics course did not adversely affect their grade.

The students reported that they did not get to know the students in the distant classes as well as the students in their regular classes. When asked to list the system's strong points, six students said that it was a good opportunity to use computers. Five said that it was a good experience and a good way to learn. Four said that it was fun and four others said that it was a good way to meet other students.

As for the system's weak points, five mentioned minor technical difficulties. Four said that the audiographics classes were more difficult than the regular classes. Four pointed out that there was only one computer for each class.

Plans for Future Development: The Pennsylvania Teleteaching Project

In addition to program expansion, administrators at Riverview IU plan to add several optical scanners which can provided on a loan basis to member schools. These will enable teleteachers to incorporate professional graphics much more easily in their lessons. Plans also include the purchase of 20 to 30 Computer Aided Conferencing System (CACS) software packages from TSN Systems of Boiling Springs, Pennsylvania. According to Gary Neights, President of TSN

Systems, "CACS is an upgrade from CATS. In addition to everything accomplished by CATS, it lets the teleteacher import applications programs such as WordPerfect, Versa CAD, or Lotus 1-2-3 which run interactively to multiple sites from the host computer. When imported into CACS, the applications programs can be accessed at each site for training and interaction between all users. CACS also has a higher graphics resolution than the CATS version, a larger selection of color options, and more function capabilities. Like CATS, it is easy for teleteachers to learn and use."

Another plan is to continue work on an electronic bulletin board which was installed in 1989. In the coming year, training to teleteachers on how to use the bulletin board to download slides and network with other teleteachers and PTP staff will be provided. Plans are also underway with three state universities -- Bloomsburg, Indiana, and Slippery Rock to produce Advanced Placement courses in geography, mathematics, and science.

In the past, Riverview IU has provided maintenance and trouble shooting to member schools at no charge. To reduce operational expenses, these costs will be transferred to member schools in the coming year.

Plans for Future Development: NCSTU and St. Joseph's Catholic School

Administrators at the NCSTU hope to link up to the seven state supported juvenile detention facilities to share programming. They also feel it is important to maintain linkages with regular schools such as Dansville High and Mansfield High so that their students still have contact, albeit only over the telephone and by computer, with regular school students.

The principal at St. Joseph's Catholic School would like to join with other parochial schools in the diocese to share programming.

Summary

The Pennsylvania Teleteaching Project is the most extensive state wide audiographics network in the United States. Arnold Hillman, Executive Director of the Riverview IU has stated (Pennsylvania Teleteaching Project, p. 2):

> Riverview Intermediate Unite is exceedingly proud to be the host and coordinating agency for the Pennsylvania Teleteaching Project. If you believe in equity for youngsters in all parts of our society, then you too will be excited about this project. Schools can now have access, beyond their borders, to courses that they could not either afford to teach, or did not have the staff to teach. It is a boon to small and rural districts and can be applied cost effectively to other agencies and organizations.

In cooperative efforts, Dansville School District, Dansville High school, St. Joseph's Catholic School, and the North Central Secure Treatment Unit have formed linkages to meet collective needs. In each case, there has been strong administrative support and teacher interest. The initial investment for equipment, though supplied by external resources, has not been overwhelming, and ongoing operational costs are very low.

Due to North Central's unique student population and environment (residential security), audiographics has been a vital medium for offering elective courses to supplement the unit's core curriculum. According to Jim Gerdy, "Audiographics and corrections education make good bed-fellows."

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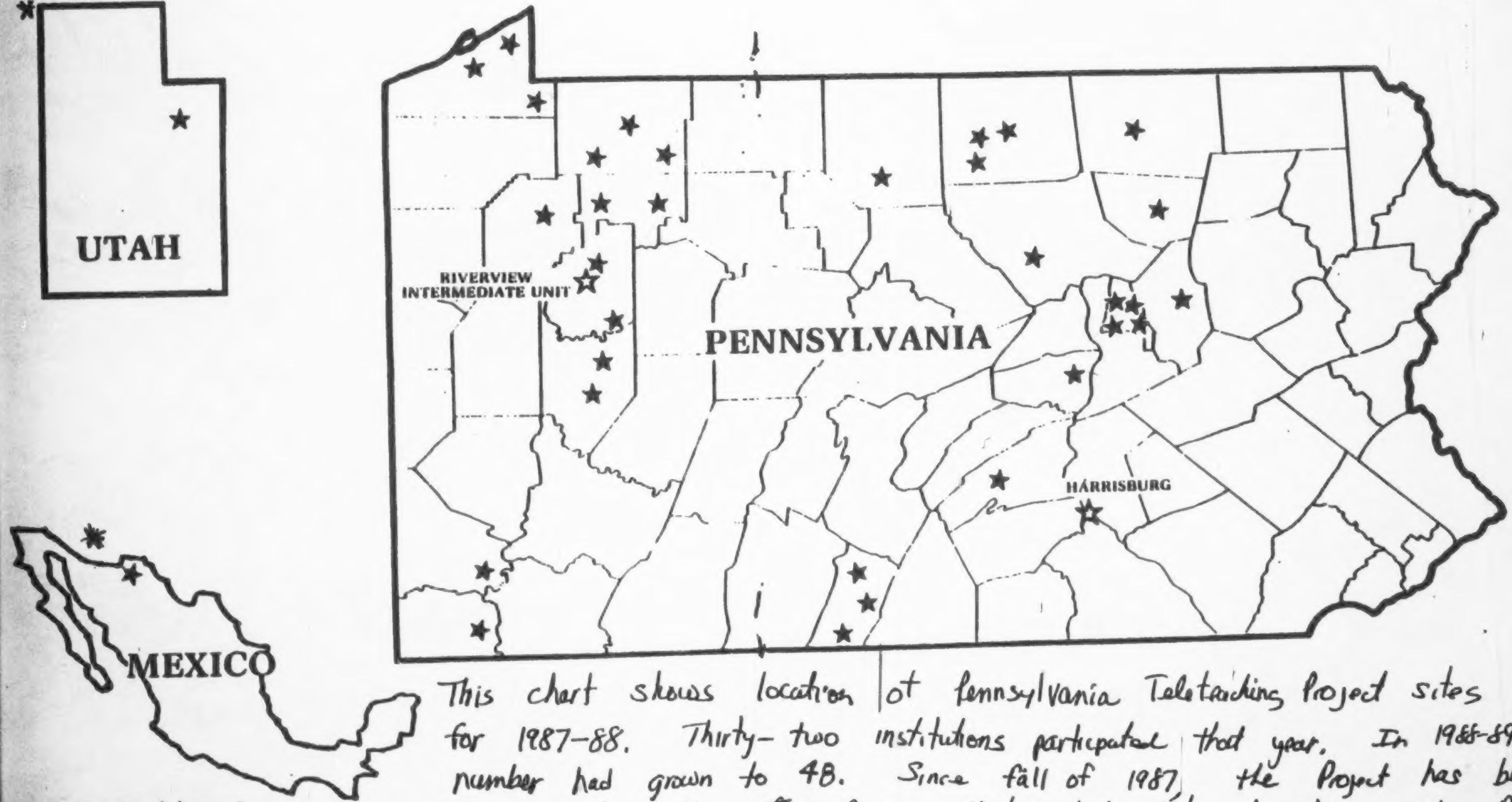
APPENDIX A



A social Psychology class between Utah and Mansfield, Pennsylvania, and a Spanish course from Juarez, Mexico to Oil City, Pennsylvania are received.

This chart shows location of Pennsylvania Teleteaching Project sites for 1987-88. Thirty-two institutions participated that year. In 1988-89, the number had grown to 48. Since fall of 1987, the Project has been managed by the Riverview Intermediate Unit at Shippenville, Pennsylvania. The configuration for most schools to participate on the network is as local cooperatives of 2 or 3 schools linked together. In 1988-89, no cooperative was larger than 3 schools. Data provided by Riverview Intermediate Unit, 1989.

Appendix B

Estimate of Costs to Receive Tele-courses Via Audiographics From the Perspective of Pennsylvania Teleteaching Project Member Schools

Equipment and software:	3,350.00	
Monthly operating costs:	45.00	per month long distance phone charges (varies due to distance, number of sites and time spent on the phone)
Subscription fee:	none	

Personnel: Tele-teacher for each course
Facilitator for each classroom

Note: All equipment costs have been provided through money from the Pennsylvania Department of Education. The only costs to the partner schools are telephone bills and toll calls. Since many partnerships are within local calling distance, there are no tolls. Costs vary among schools depending on the number of courses taken, distance between cooperating schools, etc. Since print materials are sent by mail rather than fax, there are additional postage expenses.

APPENDIX L

Pennsylvania Teleteaching Project, Course List, May 1989. Supplied by the Riverview Intermediate Unit, Shippenville, Pennsylvania.

RECEIVING SITE	COURSE	SENDING SITE
Austin High School	Physics	Southern Fulton High School
Austin High School	Spanish	Keystone High School
Benton Area High School	Computer	North Central Secure Treatment Unit
Bethlehem Center High School	Pascal	Mapletown High School
Corry Area High School	Pascal	North East High and Iroquois High
Corry Area High School	Shared Physics	North East High and Iroquois High
CSIU Alternative School	Science	Central Columbia Middle School
Danville High School	CAD	North Central Secure Treatment Unit
Forbes Road High School	SAT	Central Fulton High School
IU6 Alternative School	English	Franklin High School
Iroquois High School	Pascal	North East High and Corry Area High
Iroquois High School	Shared Physics	North East High and Corry Area High
Karns City High School	Spanish	Moniteau High School
L. Ray Appleman Elementary	Science	Central Columbia Middle School
Liberty High School	Calculus	Mansfield High School
Liberty High School	Word Processing	Mansfield University
Loyalsock High School	Inter-school Computer	Loyalsock High School
Loyalsock High School	Spanish Enrichment	Centro Internationale de Idiomas

Appendix C (continued)

RECEIVING SITE	COURSE	SENDING SITE
Loysville YDC	Social Skills	North Central Secure Treatment Unit
Mansfield University	Teacher Training	Mansfield University
Mapletown High School	Advanced English	Bethlehem Center High School
Mapletown High School	CAD	Bethlehem Center High School
Millville High School	Science	Millville High School
Mon Valley Consortium		
McKeesport S.D.	Teacher Preparation	Penn State/McKeesport Campus
West Mifflin S.D.	Teacher Preparation	Penn State/McKeesport Campus
Elizabeth-Forward S.D.	Teacher Preparation	Penn State/McKeesport Campus
Bentworth S.D.	Teacher Preparation	Penn State/McKeesport Campus
Bethlehem Center S.D.	Teacher Preparation	Penn State/McKeesport Campus
Brownsville S.D.	Teacher Preparation	Penn State /McKeesport Campus
Moniteau High School	German	Karns City High School
No.Cen. Secure Treatment Unit	CAD	Mansfield High School
No.Cen. Secure Treatment Unit	Computer Course	Danville High School
North East High School	Pascal	Corry Area High and Iroquois High
North East High School	Shared Physics	Corry Area High and Iroquois High
North Penn High School	Word Processing	Mansfield University
Reading High School	In house project	Reading High School
Redbank Valley High School	Spanish Enrichment	Centro Internationale de Idiomas

Appendix C (continued)

RECEIVING SITE	COURSE	SENDING SITE
Southern Fulton High	SAT	Central Fulton High School
St. Joseph Elementary	Chaper I Reading	Mahoning Cooper Elementary
Sullivan County High School	Remedial Health	Towanda High School
Tidioute High School	Chemistry	Warren High School
Tidioute High School	SAT English	Sheffield High School
Tidioute High School	SAT Math	Sheffield High School

APPENDIX D

PROFESSIONAL GUIDELINES
TELETEACHING PROJECT
COMMONWEALTH OF PENNSYLVANIA

PREPARED 6/87 BY:

Dr. Donald Byerly/ Superintendent, Loyalsock Township School District
Mr. Bill Steinhart/ Director, Basic Education PSEA
Dr. Robert Swinsick/ Professor, Mansfield University

REVISED 5/88 BY:

Mr. Bill Steinhart/ Director, Basic Education PSEA
Dr. Arnold Hillman/ Executive Director, Riverview Intermediate Unit
Dr. Robin Gates/ Curriculum Director, Riverview Intermediate Unit

PROGRAM PURPOSE

The following constitutes acceptable rationale for offering telecourses through the project:

1. **Enrichment**
2. **Provide advanced offerings**
3. **Provide courses required by law, but which lack sufficient enrollment in a single district, or building within that district.**
4. **To be utilized where appropriately certified personnel are not available (i.e., may have chemistry and other sciences, but no one with dual areas which include physics.)**

Teleteaching and course offerings shall not be utilized to:

1. **Consolidate or reduce offerings.**
2. **Reduce staff; or**
3. **Because of budget or financial exigency.**

PERSONNEL SELECTION

Selection of teachers to become in involved in the teleteaching project can be implemented through the following or similar processes:

1. **Establish a voluntary pool of teachers interested in involvement in teleteaching (i.e., Induction Model Process.)**
2. Establish a criteria for teleteaching including minimally a Level II certificate. The criteria should be both descriptive and prescriptive.
3. The chief School Administrator will select teachers and associates from the pool. Associate teleteachers shall undergo appropriate training for their role.
4. All personnel participating shall be certified:
   - A. Teleteachers certified in the area of the course offering.
   - B. Teaching Associates professional certified.

PERSONNEL COMPENSATION

The following guidelines should apply to those teleteachers designing a new course or offering already established telecourses:

1. First time teleteachers offer only one course.
2. Establish a two course maximum for experienced teleteachers.
3. No limit on sections of each telecourse during the teaching day other than constraints within each district or local Collective Bargaining Agreement.

   Example: Teacher A may teach 3 sections of Chemistry II. This would be considered 1 preparation with 3 classes in the offering. In a normal 6 period day, teacher A could also teach a maximum of 4 sections of Chemistry II and have 1 period as a teleprep class and 1 period as a normal prep period consistent with guidelines found in item no. 4 below.
4. A teleteacher will have the following options for preparation assuming no other assignment is given to the teleteacher such as: (a) Homeroom, (b) Activity period, (c) Detention hall, (4) Study hall, or (5) Other school duty or assignment:
   - A. The teleteacher has the option of teaching with or without live students.
   - B. The teleteacher will teach at a location approved by the Project Director.
   - C. The teleteacher is given a minimum of one period for preparation or compensation for work done before or after the normal work day, during the summer, and/or during non-school days. Compensation in lieu of preparation time may also be considered.

D. The administration will provide either secretarial assistance each day, or design opprotunities for students to participate in an advanced computer graphics production class to assist the teleteacher. This could be done with or without credit for the students.

5. The teleteacher will be responsible for preparing teleclass materials at least one week in advance of utilization and will mail no more than one package of materials per satellite site per week.

SYSTEM DELIVERY POLICY

1. Teleteachers will not be permitted to send their lessons (slides) live during, before, or after the lesson except in special circumstances, which include the following:

   Rural telephone lines are poor quality and lesson transmission may not be accurate.

   Concerns of the project relating to this item include:

   A. Teachers are utilizing excess time in sending and resending slides which creates ineffective use of the teacher's scheduled time.

   B. Schools will usually pay a double toll for this extra time and it may add $7 to $20 per lesson to the cost of each lesson transmitted.

   C. Sending slides live during a lesson is ineffective use of student time and reduces the effectiveness of the teacher and the amount of material which can be covered during each class.

PROFESSIONAL SCHOOL BASED INSERVICE

1. Teleteachers will be provided seven (7) days of substitute coverage in order that they may visit the satellite sites and receive advanced training.
2. Teaching Associates will be provided four (4) days of substitute coverage in order that they may visit the transmitting site and other satellite locations and receive advanced training.
3. Both teleteachers and teaching associates will be provided with appropriate travel funds.
4. Once a semester teleteachers will visit other teleteachers.

• Appendix D (continued)

OTHER FACTORS OF CONSIDERATION

The following are considerations which are essential to the success of the project and course offerings:

1. Provide uniformity of compensation and work conditions within the district(s) participating in the project.
2. It is recommended that the total class size including all cites shall not exceed thirty (30). This could vary based upon unique circumstances within the setting of each district(s) and course(s) offerings. If a course normally has 12-14 students, the size of the teleclass should remain the same.
3. A regular certified teacher shall be employed when class size reaches 15 at a single location.
4. Establish criteria for student selection and participation in the courses offered. Input from the following relating to criteria:
   a. Administrators
   b. Teachers

LONG RANGE CONSIDERATIONS AND NEEDS

The following need to be given careful consideration:

1. Develop an annual study of project and district needs in terms of:
   A. Appropriate training for new personnel in the project.
   B. Competencies essential to being a teleteacher or teaching associate.
   C. Student selection procedures.
   D. Impact on the learning process with students involved in telecourses.
2. Develop an instrument to acquire generic and specific data of participating districts which identifies unique parameters of participating districts and may call for exceptions to the guideline policies.
3. Develop a plan for the ultimate institutionalization of the project through State Board of Education Regulations.

Appendix E

Results of Questionnaires Received from Dansville High School and from the North Central Secure Treatment Unit

Administrator Questionnaire
(1 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. ESTIMATE the total enrollment of your school. Avg. = 28

2. ESTIMATE how many students in your school are enrolled in audiographics courses. Avg. = 10

3. Describe the academic level of students participating in audiographics courses.
   a) mostly "A" and "B" students = 0 students
   b) mostly "C" students = 1 student
   c) mostly "D" and "F" students = 0 students
   d) all types of students = 0 students

4. How would you describe the classroom manager/facilitator of audiographics courses?
   a) certified teacher in subject area being taught = 0 facilitators
   b) certified teacher, but not in subject area being taught = 1 facilitator
   c) teacher aide = 0 facilitators
   d) volunteer = 0 facilitators
   e) other = 0 facilitators

5. ESTIMATE the number of hours you spent last semester observing the audiographics course(s) in your school. Avg. = 5

Based on your experience with students being taught via satellite, answer the questions below, using the following five point scale:

	Strongly Disagree 1	2	3	4	Strongly Agree 5
6. The quality of audiographics teaching in our school is as good as the quality of our regular teaching.	Avg. = 3.5				

7. Regular classroom teachers in our school feel their jobs are threatened by audiographics instruction. Avg. = 1

8. The teacher union (or state teachers' organization) in our state is supportive of the use of audiographics in our school. Avg. = 3

9. Parents in our district are supportive of the use of audiographics in our school. Avg. = 3

10. Our school board is supportive of the use of audiographics in our school. Avg. = 4

Rate each of the following items on the basis of "Poor" to "Excellent":

	Don't Know	Poor				Excellent
	0	1	2	3	4	5
11. Attitude of students toward audiographics courses.	Avg. = 4					
12. Attitude of students toward audiographics teachers.	Avg. = 4					
13. Quality of student learning achieved via audiographics.	Avg. = 4					
14. Overall attitude of teachers in your school regarding quality of courses taught via audiographics.	Avg. = 3					
15. Use of audio-visual aids in audiographics courses (e.g. pictures, overhead transparencies, films, videos, etc.).	Avg. = 3					
16. Frequency of actual teacher/student interaction in audiographics courses (that is, audiographics teacher actually addressing individual students and students verbally responding to audiographics teacher).	Avg. = 4					
17. Benefit of audiographics courses to your school's instructional program.	Avg. = 3.5					

18. Cost effectiveness of audiographics courses
-- that is, has the learning achieved by
students been worth the money? Avg. = 3.5

19. Do you formally evaluate the audiographics teachers in the same way you evaluate the regular teachers?
a) yes = 0 formal evaluation
b) no = 1 formal evaluation

20. What are the two or three major benefit(s) of audiographics courses for your school?

1. Ability to expand curriculum. = 1 response
2. Student interaction in curriculum areas not taught internally. = 1 response
3. Networking with the school district. = 1 response

20. What, if any, have been the major problems you've encountered?

1. Scheduling conflicts. = 1 response
2. Minor technical difficulties. = 1 response

Audiographics Teacher Questionnaire
(5 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. How many years have you taught school? Avg. = 10.4 years

2. How many years have you been teaching TV courses? Avg. = 2 years

3. Do you teach any regular classes?
   a) yes = 5 responses
   b) no = 0 responses

4. What is your highest college degree? Bachelors = 1
   Masters = 2

5. Did you receive training for your TV teaching assignment?
   a) yes = 3 responses
   b) no = 2 responses

6. How many students are enrolled in your audiographics course(s)?
   Avg. = 16 students

7. How many sites are there in your audiographics course(s)?
   Avg. = 2 sites

8. When working with the interactive teaching technology, are you able to recognize each of your students and call on them by name?
   a) yes = 2 responses
   b) no = 3 responses

9. ESTIMATE what you think is the ideal class size (all sites combined) for a distance education class. Avg. = 14 students

10. At what point do you think class size (all sites combined) becomes too large? Avg. = 20 students

11. ESTIMATE how long it takes, on the average, to prepare a daily lesson for your audiographics course. Avg. = 70 minutes

12. ESTIMATE how many days it takes for students in your audiographics course to have their homework assignments/tests graded and returned to them.
Avg. = 5.25 days

13. For a typical audiographics course, ESTIMATE the number of telephone calls you receive from parents of students during an average semester.
Avg. = .2 calls

14. For a typical audiographics course ESTIMATE the number of telephone calls you initiate to parents of students during an average semester.
Avg. = .2 calls

15. Is your audiographics teaching formally evaluated by school principals (or other administrators) at distant site locations?
   a) yes = 0 responses
   b) no = 5 responses

16. Is your audiographics course(s) mostly geared for
   a) remedial students? = 1 student
   b) average students? = 1 student
   c) advanced students? = 0 students
   d) mixture of all of these = 3 students

17. Do you receive a higher salary for teaching audiographics courses than you would if you taught in a regular classroom?
   a) yes = 0 responses
   b) no = 5 responses

18. Do you have a reduced teaching load, as compared to a regular teacher, because you are an audiographics teacher?
   a) yes = 0 responses
   b) no = 5 responses

19. What are the THREE most important ways that audiographics teaching is different from regular classroom teaching?

   1. Teacher has to be better prepared. = 2 responses
   2. More responsibility on the students. = 2 responses
   3. No control over distant students. = 2 responses

Answer the questions below, based on the following five point scale:

	Strongly Disagree				Strongly Agree
	1	2	3	4	5
20. Audiographics technologies will replace regular classroom teachers.	Avg. = 1				

21. Preparing lesson materials for delivery via audiographics technologies is much more time consuming than preparing lessons for regular teaching. Avg. = 4.4

22. Students in my audiographics course(s) are assigned as much homework as students in regular classes. Avg. = 3

23. Student cheating on tests or assignments occurs very infrequently in my audiographics course(s). Avg. = 4.4

24. Students at different sites frequently interact (exchange questions, comments, or otherwise talk back and forth with each other) during my audiographics course(s). Avg. = 2.2

Regular Teacher Questionnaire
(5 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you aware that "distance education" courses are being taught in your school?
   a) yes = 5 responses
   b) no = 0 responses

2. Have you ever observed the distance education class(s)?
   a) yes = 5 responses
   b) no = 0 responses

   If yes, how would you rate the quality of instruction provided students (on a 5 point scale where "1" is "poor" and "5" is "excellent")? Avg. = 3.8

3. Have you taken any inservice training courses at your school that have been presented in a "distance education" delivery mode?
   a) yes = 2 responses
   b) no = 3 responses

   If yes, a) ESTIMATE the number of courses. Avg. = 1.5 courses

   b) Rate the quality of training presented (on a 5 point scale where "1" is "poor" and "5" is "excellent") Avg. = 4.5

   c) Did you interact with the audiographics teacher during a course?
      a) yes = 1 response
      b) no = 1 response

   d) Did you interact with other teachers at your site during a course?
      a) yes = 2 responses
      b) no = 0 responses

   e) Did you interact with other teachers at other sites during a course?
      a) yes = 0 responses
      b) no = 2 responses

4. Which type of inservice classes do you prefer?
   a) traditional inservice with an on-site trainer/instructor = 4
   b) training delivered via one-way audiographics. = 1

5. During a typical inservice training program presented over your school's audiographics system, ESTIMATE the number of actual trainer/teacher interactions that actually occur. Avg. = 3

Based on your knowledge of TV courses offered to students at your school, answer the questions below, using the following five point scale:

	Don't Know	Strongly Disagree				Strongly Agree
	0	1	2	3	4	5
6. Audiographics courses appear to be more difficult than traditional courses.	Avg. = 2.4					
7. Students would do better in a traditional setting.	Avg. = 3.2					
8. Students would rather take a audiographics course than a course in a traditional setting.	Avg. = 3					
9. The audiographics teacher seems to be personable with students (seems to convey a feeling of caring about students).	Avg. = 3.4					
10. The audiographics courses will help students at our school get into college.	Avg. = 2.4					
11. Students typically have to work harder during a audiographics course than in regular classes.	Avg. = 2.4					
12. Only certain students at this school are allowed to take a audiographics course.	Avg. = 2.6					
13. Offering courses via audiographics will significantly reduce job opportunities for regular classroom teachers.	Avg. = 1.2					

14. Would you like to teach a audiographics course?
   a) yes = 4 responses
   b) no = 1 response

15. What are the two or three major strong points of the audiographics teaching in your school?

    1. Ability to expand the curriculum. = 3 responses
    2. Provides service to exceptional students. = 1 response
    3. Provides access to good teachers. = 1 response

16. What are the two or three major weak points of the satellite teaching in your school?

    1. Scheduling conflicts. = 3 responses
    2. Time consuming in terms of teacher prep. = 2 responses
    3. Minor technical problems. = 2 responses

17. ESTIMATE the number of times you have observed instruction on the audiographics system in your school. Avg. = 21 times

Facilitator Questionnaire
(2 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you certified to teach in the subject being offered?
   a) yes = 0 responses
   b) no = 2 responses

2. How many audiographics courses do you oversee? Avg. = 2 courses

3. Are audiographics courses at your school mostly geared for
   a) remedial students? = 0 students
   b) average students? = 1 students
   c) advanced students? = 0 students
   d) other? = 0 students

4. Is the audiographics system used for teacher in-service training?
   a) yes = 0 responses
   b) no = 2 responses

5. ESTIMATE the total number of hours you spent training for your tasks in the audiographics classroom. Avg. = 3 hours

6. ESTIMATE the total number of times students in an average audiographics class talk to the audiographics teacher each week. Avg. = 4 times

7. ESTIMATE the average number of students in a audiographics class at your site. Avg. = 10 students

8. ESTIMATE the average number of students in an entire audiographics class (including all sites). Avg. = 43 students

Answer the questions below, based on the following five point scale:

	Strongly Disagree 1	2	3	4	Strongly Agree 5
9. Audiographics courses appear to be more difficult than traditional courses.	Avg. = 2.5				

10. Students would do better in a traditional setting. Avg. = 2.5

11. Students would rather take a audiographics course than a regular course. Avg. = 3.5

12. The audiographics teacher seems as knowledgeable as the regular teachers in this school. Avg. = 3.4

13. I can easily contact the audiographics teacher if I need to. Avg. = 3.5

14. The audiographics course will help students get into college. Avg. = 3

15. Students have to work harder during an audiographics course. Avg. = 4

16. Only certain students at this school are allowed to take an audiographics course. Avg. = 4.5

17. Homework assignments are returned to the audiographics students more slowly than to the regular students. Avg. = 4

18. The audiographics teacher can recognize the students' voices and call them by name. Avg. = 3

19. The audiographics teacher asks more questions than a regular teacher would. Avg. = 3.5

20. Student cheating on tests or assignments occurs very infrequently in this audiographics course. Avg. = 4.5

19. What are the system's strong points?

1. Ability to expand the curriculum. = 1 response
2. Improves student study skills. = 1 response

20. What are the system's weak points?

1. Minor technical problems. = 1 response
2. No personal contact with most of the students. = 1 response

Student Questionnaire
(14 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. What year are you in school?
   a) 9th grade = 1 student
   b) 10th grade = 2 students
   c) 11th grade = 6 students
   d) 12th grade = 4 students
   e) other (explain) = 1 8th grader

2. ESTIMATE your grade point average for the past three years.
   a) "A" student = 0 students
   b) "B" student = 5 students
   c) "C" student = 9 students
   d) "D" student = 0 students

3. If you had a choice between enrolling in a audiographics course or taking the same course in a regular classroom, which would you choose?
   a) regular class = 4 responses
   b) audiographics class = 10 responses

4. Are you taking this course for Advanced Placement?
   a) yes = 0 responses
   b) no = 14 responses

5. How many audiographics courses are you enrolled in? Avg. = 1.7 courses

Answer questions 6, 7, 8, 9 and 10 for your most enjoyable audiographics course. (If you are enrolled in only one course, then answer for that course.)

6. ESTIMATE the number of times during the last week that you contacted your audiographics teacher. Avg. = 6 times

7. ESTIMATE the number of times during the last week that your audiographics teacher contacted you. Avg. = 6.9 times

8. Is this class an elective or is it required?
   a) elective = 14 responses
   b) required = 0 responses

9. How many students are in the class at your site? Avg. = 7 students

10. ESTIMATE the number of students in the entire class (including all sites). Avg. = 21 students

Answer the questions below, based on the following five point scale:

Don't Know	Strongly Disagree				Strongly Agree
0	1	2	3	4	5

11. Audiographics courses are more difficult than regular classes taught in school. Avg. = 2.46

12. I could make a better grade if the course was taught in a regular setting. Avg. = 2.5

13. I've gotten to know the students in my audiographics course as well as the students in my regular classes, even though my audiographics classmates are farther away. Avg. = 2.77

14. I work more closely with the students in my on site audiographics class than with students in my regular classes. Avg. = 3.5

15. My audiographics teacher is as friendly to me as most regular teachers in my school. Avg. = 4.14

16. I can easily contact the audiographics teacher to ask questions or make comments if I want to. Avg. = 3.75

17. The audiographics course(s) I am taking will help me get into college. Avg. = 3.11

18. I have to work harder in my audiographics course than I do during a regular class. Avg. = 2.43

19. Only certain students at my school get to take a audiographics course. Avg. = 3.64

20. Homework assignments are returned more slowly in audiographics courses than they are in most of my regular classes. Avg. = 3

21. The audiographics teacher knows all of the students at my site by name. Avg. = 4.17

22. The audiographics teacher asks more questions during class than most regular teachers do. Avg. = 3.62

23. What are the three best things about a audiographics course?

   1. Opportunity to use computers. = 6 responses
   2. Good way to learn. = 5 responses
   3. Exciting experience. = 5 responses

24. What are the three worst things about a audiographics course?

   1. Minor technical problems. = 5 responses
   2. The classes are difficult. = 4 responses
   3. There is only one computer. = 4 responses

Appendix F

Information contained in this case study was obtained via printed materials supplied by Dennis Wydra, former director of the Pennsylvania Teleteaching Project; from survey data mailed from Dansville High School and the North Central Secure Treatment Unit in March 1989; and from on-site interviews and class observations with the following individuals on the dates listed below:

March 9
Dennis Wydra
Professor of Education
and Past Director
Pennsylvania Teleteaching Project (1986-87)
Mansfield University
Mansfield, Pennsylvania

Cynthia Wydra
Volunteer Secretary
Pennsylvania Teleteaching Project (1986-87)
Mansfield University
Mansfield, Pennsylvania

George Mullen
Provost
Mansfield University
Mansfield, Pennsylvania

Rod Kelchner
President
Mansfield University
Mansfield, Pennsylvania

Phil Brennan
Mathematics Teacher
Mansfield High School
Southern Tioga School District
Mansfield, Pennsylvania

Charlotte Goldsmith
Librarian
Liberty School District
Southern Tioga School District
Liberty, Pennsylvania

March 10

Robert Swinswick
Professor
Department of Education
Mansfield, Pennsylvania

Frank Ferrari
Business Manager
Dansville Area School District
Dansville, Pennsylvania

Steve Keifer
Computer Education Teacher
Dansville High School
Dansville, Pennsylvania

Ron Valani
Principal
St. Joseph's Elementary School
Dansville, Pennsylvania

Barbara Fleming
Reading Specialist
Dansville Area School District
Dansville, Pennsylvania

Richard C. Kelly
Director
North Central Secure Treatment Unit
Dansville, Pennsylvania

Jim Gerdy
Headmaster
North Central Secure Treatment Unit
Dansville, Pennsylvania

Mark Piazza
Vocational Educational Teacher
North Central Secure Treatment Unit
Dansville, Pennsylvania

Selected inmates at the North Central Secure Treatment Unit
Dansville, Pennsylvania

Telephone interviews were also conducted with the following individuals on the dates noted:

May 25 and June 2, 1989

Gary Neights
President, TSN Systems
Box 547
Boiling Springs, Pennsylvania
    Formerly, Technical Liaison
    Pennsylvania Teleteaching Project, 1985-87
    Pennsylvania Department of Education

May 30 and June 2, 1989

Dorthy L. Hajdu
Administrative Liaison
Pennsylvania Teleteaching Project
Riverview Intermediate Unit
R.D. 2, Greencrest Drive
Shippenville, Pennsylvania

Revised Copy
May 1989

THE PANHANDLE SHARE-ED VIDEO NETWORK IN BEAVER COUNTY OKLAHOMA: A LOCALLY OWNED DIGITAL FIBER OPTICS SCHOOL/BUSINESS PARTNERSHIP

Background Information

Once known as "no-man's land," the panhandle of western Oklahoma is the least populated and most geographically isolated portion of the state. Three counties make up the panhandle -- Cimarron, Texas, and Beaver. The panhandle is that area of Oklahoma that is due north of the Texas panhandle and due south of western Kansas, approximately 160 miles long by 35 miles wide. In the 1920's this area was known as the "dust bowl" and inspired Steinbeck's famous novel *The Grapes of Wrath*.

Beginning in the Fall of 1988, four small school districts in Beaver County began supplementing their high school curriculum via a two-way, full-motion, state-of-the art fiber optics television network. The system links a designated TV classroom in each of the districts four high schools. The two-way TV system has enabled the four districts to share teachers electronically for an expansion of high school credit courses. In addition, administrators have used the system to offer in-service training to teachers, provide community education programs for local residents, and for conference meetings of administrators and teachers between schools. Establishment of the system is the culmination of several years of investigation into alternative technologies by school administrators in Beaver, Balko, Forgan, and Turpin school districts. The technology permits both audio and video interaction between the host teacher and students at each of the receiving site locations. Students can both see and hear their teacher as well as see and hear their "classmates" at the different sites. Likewise, the teacher is able to both see and hear each student at the remote site(s).

Educational Context and Community Served

Beaver County is the most eastern of the three counties which comprise the panhandle area of extreme western Oklahoma (see Appendix A). The area is some 300 miles northwest of Oklahoma City. The county consists of 1,817 square miles with a total population of approximately 7500 residents. Although sparsely populated, over one-third of the populace is under the age of 18. The county's economic base is chiefly wheat and cattle production. Several small oil fields are also present in the area. The terrain is rolling prairie. The area experiences severe weather conditions and is subject to tornadoes, cold temperatures in winter, and strong winds which are frequently in excess of 40 miles per hour.

The county's four school districts each serve a large land area. Each district school transportation area is respectively: Beaver, 426 square miles; Forgan, 397; Balko, 305; and Turpin, 303. Yet, the K-12 student population in each district is small: Beaver, 519 students; Forgan, 191; Balko, 159; and Turpin, 420. The districts are remote and isolated. Teacher housing is provided for many of the teachers in the area.

In the past, many advanced and special courses, if offered at all, were provided on an alternative year basis. Due to the low student enrollment in select or special courses, it had been cost prohibitive to employ a full-time certified instructor. Based on past experience -- even if funds were available -- it has often been difficult to secure the services of a qualified instructor willing to move and remain in the panhandle area for a long period of time.

With the current education focus in Oklahoma on increased high school graduation requirements, higher college entrance standards, courses for the gifted, staff development programming, etc., school superintendents in the four districts agreed that alternatives were needed to meet the instructional demands placed upon them. According to Doug Rundle, superintendent of Forgan schools, "Each of the districts in the area has a limited number of teachers and a rather restrictive curricula, and not enough state monies to rectify either of these two short comings. We had to look for new alternatives and for outside funding to help us."

Since the early 1960's the four districts had cooperated in sharing "circuit riding" or traveling teachers for selected courses. As instructional demands increased and the pool of qualified teachers decreased, however, the option of traveling teachers became less viable. Four years ago, the four superintendents and their respective school boards met to discuss alternatives that could be adopted that would ensure quality instruction in low incident courses to students and at the same time avoid loss of local control over the curriculum and individual school identity. Several of the superintendents had read about successful two-way TV systems that were operative in Wisconsin and Minnesota. From that initial meeting, it was decided that district administrators would pursue the possibility of implementing a two-way, full-motion interactive instructional television system.

During the Spring of 1985, consultants from Telesystems Associates, Minneapolis, Minnesota were contacted and asked to conduct a site-visit to Beaver County in anticipation of establishing a two-way TV system. Due to the relatively flat terrain and cost factors, they recommended that the schools use a microwave network which would make possible bidirectional communication (both video and audio) between all four schools. After further comparison between various technologies, however, the superintendents recommended to their Boards that the best technology for their project was a fiber optics network. Microwave was ruled out for two basic reasons. One, because of the serious and violent weather conditions common to the panhandle area it was felt that the construction and maintenance of microwave towers were cost competitive with fiber optic cables which would be laid in the ground and are impervious to weather. Two, establishment of a microwave system required FCC licensing and adherence to extensive FCC regulations which was deemed undesirable for a small, locally owned and controlled cooperative. It was also felt that the choice of fiber optics had greater potential for transmitting signal quality and that this choice would provide a greater range of technological options for future growth than did microwave.

The project was three and one-half years in the making. In the Fall of 1985, five administrators from the four Beaver County schools and the Oklahoma State Department of Education's Director of Rural Education traveled to Trempealeau County, Wisconsin to observe a two-way instructional TV system delivered via cable that had been frequently cited in the literature on interactive television instruction. Following that visit, it was mutually agreed by the four superintendents, with support from the state Director of Rural Education, that the four districts would seek external funding to enter into a four school cooperative to initiate their own two-way TV interactive instructional system. The four superintendents organized an effort to contact each of the private foundations in Oklahoma to seek grant monies to support the establishment of a fiber optics TV network between the four schools. Requests for funds were also made to the Oklahoma Board of Education, the State Office of Rural Education, and the Oklahoma Legislature. Jim Bouse, Superintendent of Beaver Schools stated, "We just decided that being in a geographically isolated area shouldn't be a disadvantage to our kids. We were in a situation where revenues are going down, and this is an isolated area where teachers are hard to find anyway. We were just trying to create new advantages for our students."

Description of Technology Utilized and Programming Provided

In June of 1988 actual construction for the Beaver County Interactive Educational Television Network was started. The project was completed in late August that year. The first day of teaching began on August 24, one day after the opening of the 1988-89 school year. According to Ron Strecker at Panhandle Telephone Cooperative Incorporated (PTCI) of Guymon, Oklahoma, "The operation is one of the first digital fiber optic school link-ups in the United States." PTCI officials claim that digital is the leading edge or state-of-the-art for telecommunications networking for the following reasons: all digital systems will remain compatible into the future for video, voice, and high speed data transmission; and digital equipment maintains quality on the integrity of the original signal thereby eliminating noise, whereas an analog system allows noise to be amplified along with the original signal. The network consists of 51 miles of four strand and eight strand fiber optic cable that connects Balko, Turpin, Forgan, and Beaver school districts to each other (see Appendix B). TV cameras and television monitors are located at each school. Also, each school is equipped with a studio/classroom for broadcasting and receiving classes. The system is completely interactive, allowing for total audio and visual communication between the teacher and students at each school. The teacher can both see and hear the students and students can both see and hear the teacher as well as other students at the various sites.

When designing the studio/classrooms, administrators were aware that the uniqueness of their system would attract numerous visitors. Accordingly, each classroom has a glass partition observation area that is outside camera range and which has been designed to suppress noise from discussions or comments among observers. The intent has been to minimize any disruption from interested outsiders that might affect student learning.

The studio/classrooms are essentially identical at each school and were designed to accommodate TV instruction. Each site is able to either transmit or receive instruction. There are eight 25 inch color TV monitors or screens at each studio/classroom. Four monitors are mounted from the ceiling or the back wall and face the area where the teacher stands to present instruction. In this manner the teacher at the "host" site is able to see classrooms for students at each of the three receiving schools as well as the image at the host site where the camera is focused. Four TV screens also face the students seated in each classroom. This allows them to see the TV teacher on one screen and their peers at each of the three sites on the remaining screens. At the respective host classroom, students can elect to watch their teacher "in person" or on the TV. Each classroom is also equipped with a videotape recorder that can be used to display a video, or to record a class for a student who might be absent.

The teacher station can best be described as a lectern or podium that faces the student seating area. An overhead camera can zoom in, much like an overhead projector, on materials the teacher might want to display on the TV screen. A second camera can focus directly on the teacher for lecture or discussion. A third camera focuses on the students. At each site, the teacher is able to easily switch from one camera to another. At the host site, if the teacher wishes to step down from the lecture area to work individually with students, she can simply switch to the camera that focuses on the students then walk down among her "live" class. Students at the remote sites would see and hear their TV teacher walking among and talking with their class mates at that site.

Audio interaction between sites is provided by a "live" microphone that is mounted overhead, above the student area, in each classroom. Students talk in a normal voice which is "picked up" by the overhead microphone and transmitted over the entire system. Audio interaction is possible not only between the teacher and students but also between students at different sites as well. When teaching, the TV teacher wears a lapel microphone.

Exchange of written materials (homework, tests, assignments, etc.), is generally by means of facsimile machines located next to the teacher station in each studio/classroom. Classroom materials have also been exchanged between schools by counselors who travel from one school to another or occasionally by teachers who may live in one district but teach in another. The local highway patrol has even delivered written materials between schools.

Program Offerings

For the 1988-89 school year, most programming has been for high school credit courses. Four high school courses have been offered -- Art History, Spanish, Advanced Placement English, and Accounting II (see Appendix C). In each case of "distance delivery," administrators at receiving schools have not allowed students to enroll in TV courses unless (1) the class was not offered locally or (2) if offered locally, a conflict in the student's schedule did not permit enrolling in the more traditional course when offered at the school. During its first year of operation, over 60 students (approximately 15 percent of the total high school student body in the four districts) have enrolled in TV courses. These have generally been higher achieving, college bound students. Overall class size, for all sites, at any one time has ranged from five to 20 students.

To date no elementary programs or junior high school programs have been offered and inservice training for teachers over the system has been limited. There have been discussions and plans among administrators to include inservice training in the future as well as selected programming for the lower grades. Numerous community education classes, however, have been offered including topics such as aerobics, self-image improvement, world travel, gardening, landscaping, financial aid for college bound students, farm aid, etc. During its first six months of operation, over 250 adults in the four districts have taken community education classes provided over the network.

Organization Structure and Program Costs

Among users, the network has alternately been referred to as the Panhandle Share-Ed Video Network (PSVN) Cooperative, the Beaver County Interactive Educational Television Network, or the Beaver County Telecommunications Cooperative.[1] Establishment of the network has been as a partnership between the four school districts and Panhandle Telecommunications Systems, Incorporated, a subsidiary of Panhandle Telephone Cooperative Incorporated (PTCI) of Guymon, Oklahoma. Organized as a cooperative, the members each have an equal voice in matters related to program offerings, network administration, and future developments.

As a key player in the partnership, the major role of PTCI has been to lay the fiber optic cable to the schools and to maintain the cable. The PTCI is a co-op owned by some 4200 individuals in the three county panhandle area. Administrators at PTCI have looked upon their involvement with the schools as one of rural economic development for the entire panhandle area. Low crop yields in recent years coupled with the poor agricultural economy nationally caused administrators at PTCI concern that foreclosure of some farms might precipitate the closing of schools. PTCI business administrator, Ron Strecker stated, "These schools provide education to the children of our members [PTCI Co-op members]. If any of the schools closed, we knew that PTCI would realize a loss in additional customers. So it was in our best interest to see that this did not occur. We knew that if we could help these schools out, we would also be helping out our members as well. If any of the schools were to close, then the communities would die. We wanted to keep these communities alive and this factor helped expedite our desire to participate in a joint project."

One way of to increase educational opportunities for students and reduce teacher costs was the use of a video network whereby one teacher in one school could teach her class plus teach to two or three other classes in distant schools simultaneously. When approached by the four Beaver County superintendents in the Fall of 1987 to participate in the development of a fiber optic network, officials at PTCI agreed to take part.

Program Costs and Funding Sources

A total of $340,000 in funding for installation and the first five years to operate the project has come from multiple sources. In 1986-87, the schools received a $75,000 grant from the Robert S. and Gracye B. Kerr Foundation of Oklahoma City and in 1987-88 they received $75,000 from the McCasland Foundation of Duncan, Oklahoma. The remaining $190,000 was provided through grants from the Oklahoma Board of Education, the State Legislature and the Office of Rural Education in the Oklahoma State Department of Education. See Appendix D for a breakdown of costs associated with installing and operating the Panhandle Share-Ed Video Network.

Of the grant monies received, $328,000 was paid to the Panhandle Telephone Cooperative to lay fiber cable between the four schools, to install telecommunications interface boards at each of the four sites, and to pay five years lease for use of the fiber optic lines. The remaining $12,000 provided $3000 per school for the purchase of television monitors, microphones, facsimile machines and other equipment needed in the studio/classrooms. An additional $2000-$2500 was spent from each district's local budget to design and remodel an existing classroom in each school to ready it as the TV studio/classroom (build an observation booth for visitors, build mounts for TV monitors, construct lectern stands for teachers, etc).

PTCI owns all of the fiber optics in its certified service areas including that which has been laid between the four schools. Use of the fiber to the schools is on a lease arrangement, the first five years of which have been paid as part of the $328,000 given to the PTCI to install the fiber. For the next five years (up through 1992-1993), no maintenance or other fees will be assessed to the schools by PTCI for use of the system. Beginning in the Fall of 1993, a minimal fee -- yet to be determined -- will be charged by the PTCI to maintain the fiber optics line. PTCI officials anticipate that this fee will be very low because, once fiber has been laid in the ground, maintenance of the lines is essentially cost free. The fiber optic lines between the four schools do not replace the existing telephone service between the schools.

No new personnel have been hired by any of the schools to either manage or administer the program. Superintendents have simply added management of the cooperative as a part of their job description. Other than spending a combined total $2000 of local monies for consulting by Telesystems

Associates in 1985, no other monies were spent for consulting services.

With assistance from PTCI, the entire project was conceived, planned, and initiated by local school administrators, and is now operated by them. Other than maintenance of site equipment, there are no ongoing costs to operate the network. The expense, which has been paid through grants, was to lay the fiber, install the interface boards, enter a five year lease agreement with PTCI, and purchase local equipment. No fees are charged to students for taking course work.

Role and Responsibility of Individual Schools

Because the TV network is cooperatively managed by the four schools, superintendents and building principals have direct control over matters related to programming, selection of teachers, scheduling of classes, criterion for students taking TV courses, control of overall class size, etc.

When plans were first announced that a two-way TV system would be installed, some teachers in the schools expressed concern about job security. Several state sponsored teacher organizations also expressed disfavor, fearing that TV instruction might replace teachers. The four superintendents announced from the outset that the system was never intended to replace the teacher in the classroom. The intent is to expand learning opportunities for students that would otherwise not be provided. Local teachers have since become overall supportive of the network and the Oklahoma Federation of Teachers and the Oklahoma Education Association have both endorsed the project.

Teacher-student interaction and student-to-student interaction over the network is perhaps the closest to a traditional classroom setting that present day telecommunications technologies permit. As stated previously in this report, students can both see and hear their classmates at each of the other schools as well as the TV teacher. The microphones are on an open line so full audio communication is possible between all sites. The open audio line also negates the need for any telephone dialing. Consequently, audio communication is immediate. There is no delay when asking a question, making a comment, or talking to either the teacher or another student at a distant site. The use of fiber optics has also helped to ensure that the audio transmission quality is probably the best possible with today's technologies. Overall class size has intentionally been kept small with no classes exceeding 20 students total. Teachers know each student personally and are able to involve all pupils in the learning process. At least once per semester, TV teachers travel to "receive" classrooms to formally meet students and to teach a class from their site. TV teachers also reported that it is common during football, basketball, or other district wide activities to see and talk with students who are enrolled in their TV classes.

Selection of teachers to teach TV courses is determined jointly by the superintendent and principal of each school. The four teachers selected to teach courses during the first year of operation have essentially learned on their own how to teach over a the system. Although an orientation to the equipment and system was provided, no formal training was conducted. During interviews, teachers indicated that effective teaching via two-way TV requires more thorough preparation on the part of the teacher. Richard Boothby, superintendent of Balko schools and instructor for the Accounting II course, remarked, "When I taught in the regular classroom, I really didn't worry about how prepared I was. I knew the subject matter. I kind of played it [teaching] by ear. On this system I know I have to be prepared. I'm not going to get infront of that camera on that TV tube and not be prepared."

Principals in the four schools allow one additional preparation period for those teachers teaching over the network. Principals also have the discretion to provide additional monetary compensation to TV teachers. Discussion has centered around a five percent add-on to regular salary. Evaluation of TV teachers is left to the building principal from which the respective TV class originates. Evaluative input is also sought from the principal at the receiving school(s), but the final decision is left with the principal at the originating school. Otherwise, evaluation is conducted in the same manner as that for regular teachers.

At sites receiving TV instruction, a classroom facilitator has been appointed by the school principal to serve as a proctor during the lesson broadcast. In three of the four schools, certified teachers in non-related subject areas, who did not have a full teaching loads, were assigned to proctor TV classes. At one school, an aid served as the proctor. No job description has been written for proctors, but their basic chores are to be present in the classroom to operate the fax machine, adjust equipment, distribute materials, and help make sure that the students are kept on task. The use of existing teachers or aids to serve as proctors has not necessitated hiring of any new or additional staff.

To prevent potential discipline problems in TV courses, school administrators have outlined specific standards for student behavior. Upon enrolling in a TV course, students and their parents/guardians are presented a list of student behavior policies which both are required to sign. Students agree that they will sit within the camera view area at all times, they will not mishandle equipment, and they will obey all rules specified by the TV teacher. They agree not to use inappropriate language or gestures and are informed that the TV teacher can videotape their behavior, if desired, without their knowledge. Students who violate the stated rules are given one verbal warning and told that their parents and the building principal will be notified by written letter of the infraction. If there is a second offense, students are removed from the class.

Coordination of a common bell schedule among all schools has eliminated any scheduling problems for TV classes. Decisions to offer new classes each semester are determined by the superintendents and the four building principals. Since starting the network, several teachers in the schools have expressed interest in TV teaching. Courses offered in one school, but not available in others are presented to students for pre-enrollment consideration. Programming decisions are then made on the basis of course demand and student intent. At present, plans do not include offering laboratory type courses over the network. The TV studio/classrooms would need to be significantly modified in order to install sinks, pipe water, or otherwise prepare them for classes requiring extensive student laboratory work.

Evaluative Data

Due to its newness, no formal evaluation has yet been conducted of the network. Since the initial day of broadcast, only about one hour has been lost in "down time" and that was due to a power failure.

The response to the video network has been very positive on the part of administrators, teachers familiar with the system and students who have studied on it. Roger Hilton, principal of Beaver High School commented, "The capability of this system is limited only by your imagination."

According to Cheryl Melton, the AP English teacher at Beaver High School, "There does not seem to be any student fear of nervousness of being on TV or in front of the camera. The novelty of this being a different kind of class seems to have quickly worn off the students. The kids seem to be getting used to having other people watch them.

Delores Hegglin, the Spanish instructor stated, "On a more personal level I see these kids [TV students] becoming more familiar with other kids in the county. Our county has grown closer. The other day I was at a sports activity and we were playing a rival school. Suddenly, one of the students in my TV class came running saying, 'There's my TV teacher. There's my teacher.' It really created a nice feeling of appreciation that he recognized me no only on the TV, but as a teacher. In the community, we have kids making dates over the TV. They get phone numbers and they have all kinds of nice friendships growing and they are getting to know other kids' names. The really nice thing about this is the fact that these kids are meeting in an academic setting rather than on the football field. They are meeting and learning in an academic setting."

Finally, a group of TV students studying Spanish at Forgan High School stated, "Go for it! TV classes are neat and are fun to be a part."

Survey Data

In January 1989, survey data was gathered from four groups: five administrators, four TV teachers, 26 regular classroom teachers, eight facilitators, and 44 students taking TV classes (see Appendix E for a detailed summary of survey results).

Responses From Administrators

The average enrollment of the schools was 125 students with an average of 17 students at each site taking one or more tele-courses. The administrators reported spending an average of 41 hours evaluating the system the previous semester. The administrators agreed that the quality of the tele-teaching was as good as the quality of the regular teaching. They felt that the parents and the school boards were supportive of the use of tele-teaching. They also felt that the quality of student learning via tele-courses was good, the overall benefit of tele-courses to their schools' instructional programs was good, and the tele-courses were cost effective in terms of student learning.

When asked to list the strong points of the tele-learning system, each administrator listed expanded curriculum offerings. Two listed the sharing of resources, two listed student interaction between schools, and two said that the system permitted additional flexibility in class scheduling. When asked to list weak points of the system, two administrators expressed concern that teachers in the traditional classrooms had to be assured that the system did not constitute a threat to their jobs. One reported that the system displayed minor technical problems.

Responses From Tele-teachers

The tele-teachers had an average of 17 years teaching experience and their own education level ranged from 15 hours beyond a bachelor's degree, up to a master's degree. They felt that the number of students in their tele-classes was within manageable limits for effective instruction. The tele-teachers reported spending an average of one hour in preparing a daily lesson plan for a TV course and estimated that it took three to five days for homework to be graded and returned to the students. The tele-teachers received an average of one or two telephone calls from the parents of students each semester and called parents an average of two or three times each semester. Most of the tele-teachers felt that tele-teaching technologies would not replace regular classroom teachers. They reported that cheating on tests and assignments occurred very infrequently.

The tele-teachers said that students at different sites frequently interacted with each other during the tele-course. When asked to describe how a tele-class was different from a regular class, half of the tele-teachers said that the tele-class required better preparation, restricted the teacher's classroom mobility (due to the limited camera range), and resulted in more student time on task.

Responses From Regular Teachers

Fifteen of the regular teachers had observed one or more of the tele-classes in progress. On a five point scale where "1" was "poor" and "5" was "excellent", they rated the quality of instruction "4.25". Seven of the teachers had received inservice training over the system and, using the same scale, rated the experience at "3.67". They did not feel that offering courses via tele-teaching would reduce job opportunities for regular classroom teachers.

When asked to list the strong points of the tele-courses, 84 percent of the teachers felt that the ability to expand the schools' curriculum offerings was important. Nineteen percent felt that the opportunity for students to gain college credit via tele-courses was important. Eleven percent said that the interaction between other schools and distant students was important. As weak points, 11 percent of the teachers felt that the system was costly and had technical difficulties. Seven percent said that it was difficult to coordinate with the other schools and that discipline problems could be difficult to cope with.

Responses From Facilitators

Seven of the eight facilitators were not certified to teach in the subject being offered. They had an average of three or four hours of training for their position. They said that cheating on tests or assignments occurred very infrequently in the tele-courses. When asked about the system's strong points, 87 percent of the facilitators said that it expanded the school districts' curriculum offerings. Thirty seven percent felt that the increased likelihood for new student friendships was a strong point and twenty five percent listed the possibility for increased interaction as a strong point.

Responses From Students

If given a choice between taking a regular class or taking a tele-class, sixty three percent of the students said that they would take a tele-class. The students estimated that they asked a question or made a comment in the tele-class about 16 times per week, and that the tele-teacher called on the students about ten or 11 times per week. When asked to list the system's strong points, 84 percent of the students said that the potential for meeting students and teachers from other schools was important. Sixty one percent said that the system's ability to expand the curriculum was important. Thirty eight percent said that it was an exciting new concept. As for the system's weak points, 36 percent of the students listed minor technical difficulties. Thirty four percent said that it was sometimes hard to hear the other schools. Eighteen percent said that the tele-teacher was not always available after class.

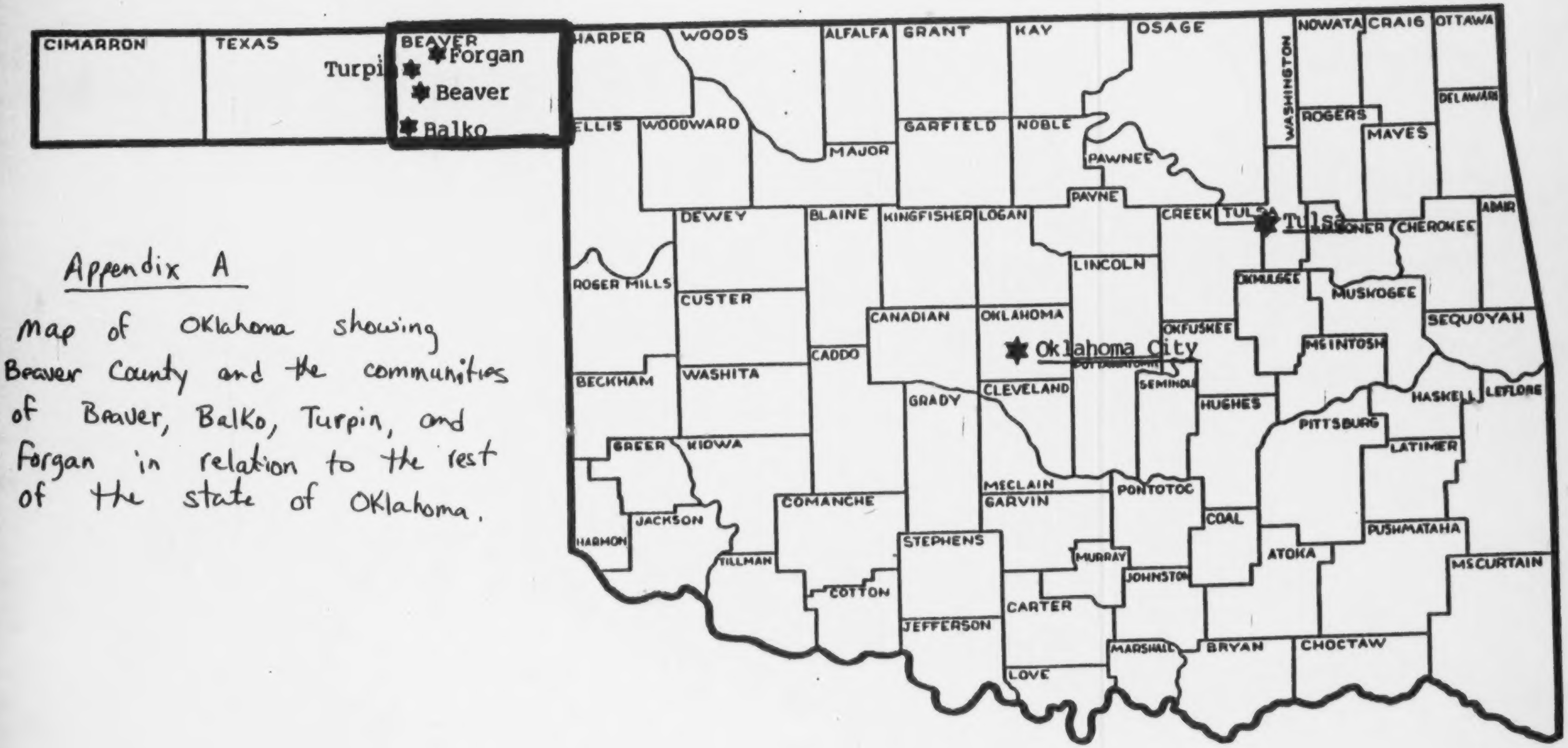
Future Plans for Development

Superintendents of the four schools have each expressed great satisfaction with the network and its potential. New courses will be added for students in accordance with student interest, state mandated curriculum reforms, and existing teacher expertise within the schools. Plans are also being developed for inservice training, expanded community education programming, and teacher or administrator oriented conferences between schools. Inasmuch as the cooperative is locally managed, it is very easy for users to hold ad-hoc meetings/conferences as desired.

The long range plan over the next three to four years is to link the schools of Cimarron and Texas Counties, also in the panhandle, with Beaver County. This would greatly expand teacher expertise and human resources between schools. The PTCI of Guymon is providing the leadership to link the remaining 8 schools in the three county panhandle area to the network (see Appendix F). Switching mechanisms would be installed that would allow schools in the three county area to connect and disconnect on an as need basis for sharing of courses and training. Also tied to the network would be Panhandle State University (PSU). With PSU joined to the schools, college credit courses or inservice training could be offered directly from the university to multiple site locations. Opportunities for educators to complete certification requirements in administration, supervision, library training, or other subject areas would be significantly enhanced. The districts in Cimarron and Texas Counties and Panhandle State University have organized to seek funds to extend the network to their institutions.

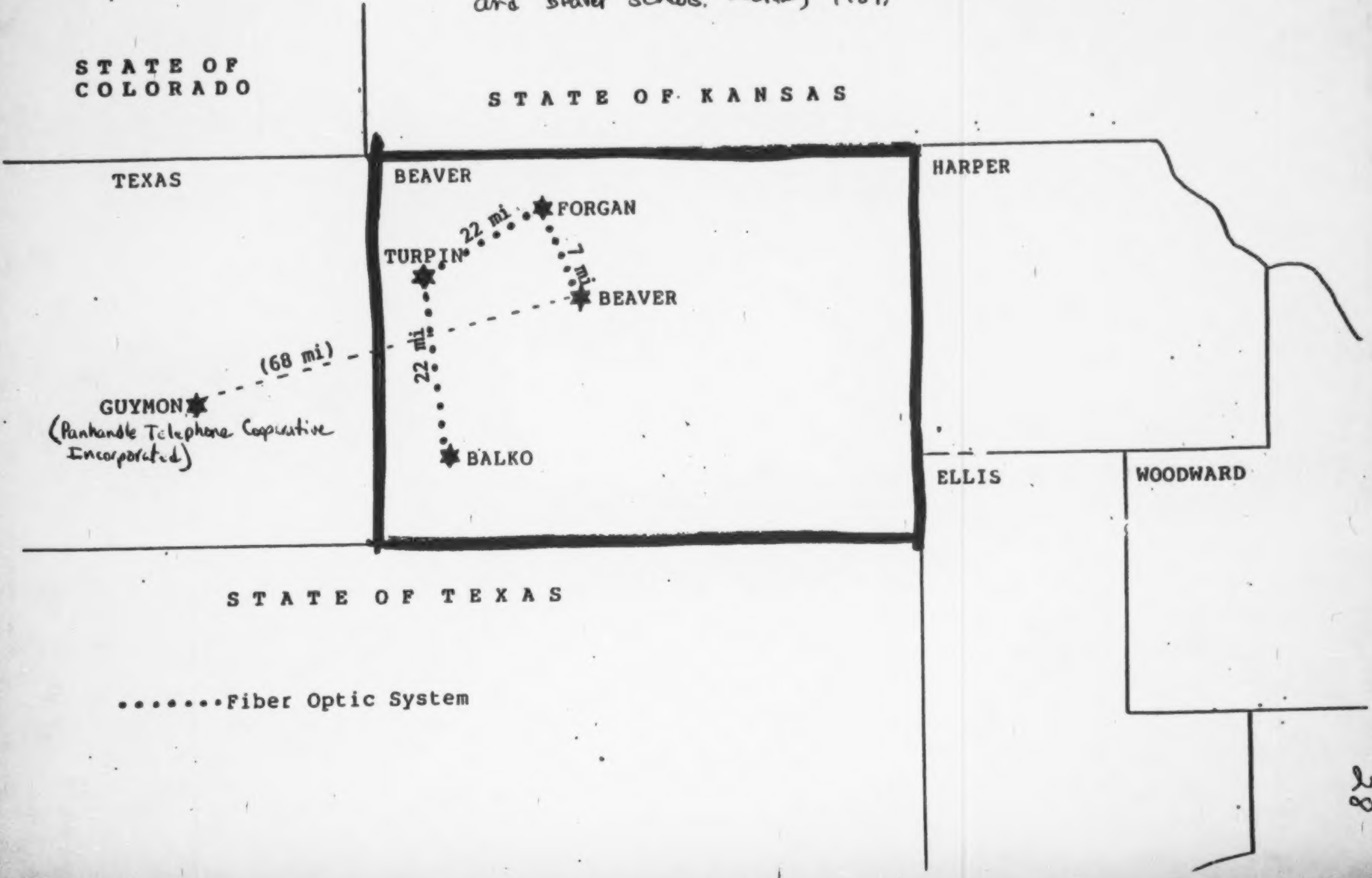
Appendix A

Map of Oklahoma showing Beaver County and the communities of Beaver, Balko, Turpin, and Forgan in relation to the rest of the state of Oklahoma.


CIMARRON
TEXAS
BEAVER
Turpi
Forgan
Beaver
Balko
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
WASHINGTON
NOWATA
CRAIG
OTTAWA
DELAWARE
ROGERS
MAYES
ELLIS
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
PAYNE
ROGER MILLS
DEWEY
BLAINE
KINGFISHER
LOGAN
CREEK
TULSA
Tulsa
WAGONER
CHEROKEE
ADAIR
LINCOLN
OKMULGEE
MUSKOGEE
CUSTER
CANADIAN
OKLAHOMA
OKFUSKEE
SEQUOYAH
Oklahoma City
POTTAWATOMIE
MCINTOSH
BECKHAM
WASHITA
CADDO
GRADY
CLEVELAND
SEMINOLE
HUGHES
HASKELL
LEFLORE
PITTSBURG
GREER
KIOWA
LATIMER
MCCLAIN
PONTOTOC
COMANCHE
GARVIN
COAL
HARMON
JACKSON
STEPHENS
PUSHMATAHA
TILLMAN
MURRAY
ATOKA
MCCURTAIN
JOHNSTON
COTTON
CARTER
JEFFERSON
MARSHALL
BRYAN
CHOCTAW
LOVE

APPENDIX B

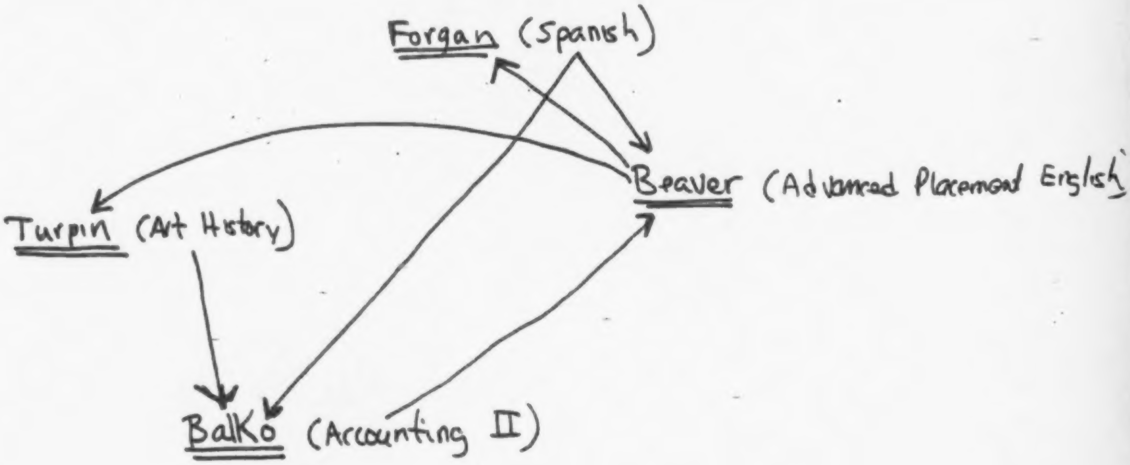
Panhandle Share-Ed Video Network showing extent of fiber optic cable laid between Balko, Turpin, Forgan, and Beaver Schools. February 1989.


STATE OF COLORADO
STATE OF KANSAS
TEXAS
BEAVER
HARPER
FORGAN
22 mi
TURPIN
7 mi
BEAVER
(68 mi)
22 mi
GUYMON
(Panhandle Telephone Cooperative Incorporated)
BALKO
ELLIS
WOODWARD
STATE OF TEXAS
•••••••Fiber Optic System

Appendix C

High school program offerings. Panhandle Share-Ed Video Network. 1988-89.

Four high school credit courses were offered for the 1988-89 school year. These have been Art History. Spanish language. Advanced Placement English. and Accounting II. Art history has been taught from Turpin to Balko. Spanish language has originated from Forgan to Balko and to Beaver. Advanced Placement English has been taught at Beaver to Forgan and Turpin. and Accounting II has been delivered from Balko to Beaver.


Forgan (Spanish)
Beaver (Advanced Placement English)
Turpin (Art History)
Balko (Accounting II)

Art History: originates at Turpin, transmitted to Balko

Spanish: originates at Forgan, transmitted to Balko and Beaver

Advanced Placement English: originates at Beaver, transmitted to Forgan and Turpin

Accounting II: originates at Balko, transmitted to Beaver

Appendix D

Estimate of Costs to Receive Tele-courses Via Two-way TV From the Perspective of Member Schools Participating in the Panhandle Share-Ed Video Network

Equipment and classroom renovation:	5,500.00
Monthly operating costs:	(no charge for first five years)

Personnel: Tele-teacher for each course

Note: The system is currently operating from a fund totaling $340,000.00 raised for equipment installation and the first five operating expenses.

Appendix E

Results From Panhandle Questionnaires

Administrator Questionnaire
(5 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer fo each of the following questions.

1. ESTIMATE the total enrollment of your school. Avg. = 126 students

2. ESTIMATE how many students in your school are enrolled in tele-courses. Avg. = 17 students

3. Describe the academic level of students participating in tele-courses.
   a) mostly "A" and "B" students = 3 students
   b) mostly "C" students = 0 students
   c) mostly "D" and "F" students = 0 students
   d) all types of students = 2 students

4. How would you describe the classroom manager/facilitator of tele-courses?
   a) certified teacher in subject area being taught = 2 facilitators
   b) certified teacher, but not in subject area being taught = 1 facilitator
   c) teacher aide = 1 facilitator
   d) volunteer = 0 facilitators
   e) other = 0 facilitators

5. ESTIMATE the number of hours you spent last semester observing the tele-course(s) in your school. Avg. = 41.4

Based on your experience with students being taught via satellite, answer the questions below, using the following five point scale:

	Strongly Disagree 1	2	3	4	Strongl Agree 5
6. The quality of the tele-teaching in our school is as good as the quality of our regular teaching.	Avg. = 5				

7. Regular classroom teachers in our school feel their jobs are threatened by "distance education" instruction. Avg. = 2.8

8. The teacher union (or state teachers' organization) in our state is supportive of the use of tele-teaching in our school. Avg. = 3.8

9. Parents in our district are supportive of the use of tele-teaching in our school. Avg. = 4.4

10. Our school board is supportive of the use of tele-teaching in our school. Avg. = 5

Rate each of the following items on the basis of "Poor" to "Excellent":

Don't Know	Poor				Excellent
0	1	2	3	4	5

11. Attitude of students toward tele-courses. Avg. = 4.4

12. Attitude of students toward tele-teachers. Avg. = 4.8

13. Quality of student learning achieved via tele-learning. Avg. = 4.4

14. Overall attitude of teachers in your school regarding quality of courses taught via tele-teaching. Avg. = 3.4

15. Use of audio-visual aids in tele-courses (e.g. pictures, overhead transparencies, films, videos, etc.). Avg. = 3.8

16. Frequency of actual teacher/student interaction in tele-courses (that is, tele-teacher actually addressing individual students and students verbally responding to tele-teacher). Avg. = 4.4

17. Benefit of tele-courses to your school's instructional program. Avg. = 4.6

18. Cost effectiveness of tele-courses -- that is, has the learning achieved by students been worth the money? Avg. = 4.6

19. Do you formally evaluate the tele-teachers in the same way you evaluate the regular teachers?
    a) yes = 4 formal evaluation
    b) no = 1 formal evaluation

20. What are the two or three major benefit(s) of tele-courses for your school?

    1. Ability to expand curriculum. = 5 responses
    2. Aids scheduling and takes advantage of shared resources. = 4 responses
    3. Student interaction between schools. = 2 responses

20. What, if any, have been the major problems you've encountered?

    1. Convincing teachers that the system is not a threat. = 2 responses
    2. Minor technical difficulties. = 1 responses

Tele-teacher Questionnaire
(4 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. How many years have you taught school? Avg. = 17.25 years

2. How many years have you been teaching TV courses? Avg. = 1 years

3. Do you teach any regular classes?
   a) yes = 3 responses
   b) no = 1 response

4. What is your highest college degree?
   Bachelors = 2
   Masters = 1
   Non responding = 1

5. Did you receive training for your TV teaching assignment?
   a) yes = 0 responses
   b) no = 4 responses

6. How many students are enrolled in your TV course(s)? Avg. = 15.5 students

7. How many sites are there in your TV course(s)? Avg. = 3.25 sites

8. When working with the interactive teaching technology, are you able to recognize each of your students and call on them by name?
   a) yes = 4 responses
   b) no = 0 responses

9. ESTIMATE what you think is the ideal class size (all sites combined) for a distance education class. Avg. = 17 students

10. At what point do you think class size (all sites combined) becomes too large? Avg. = 35 students

11. ESTIMATE how long it takes, on the average, to prepare a daily lesson for your TV course. Avg. = 60 minutes

12. ESTIMATE how many days it takes for students in your TV course to have their homework assignments/tests graded and returned to them.
Avg. = 2.5 days

13. For a typical tele-course, ESTIMATE the number of telephone calls you receive from parents of students during an average semester.
Avg. = 1.75 calls

14. For a typical tele-course ESTIMATE the number of telephone calls you initiate to parents of students during an average semester.
Avg. = 2.25 calls

15. Is your tele-teaching formally evaluated by school principals (or othe administrators) at distant site locations?
 a) yes = 1 response
 b) no = 3 responses

16. Is your TV course(s) mostly geared for
 a) remedial students? = 0 students
 b) average students? = 1 student
 c) advanced students? = 2 students
 d) mixture of all of these = 1 student

17. Do you receive a higher salary for teaching TV courses than you would if you taught in a regular classroom?
 a) yes = 2 responses
 b) no = 2 responses

18. Do you have a reduced teaching load, as compared to a regular teacher, because you are a TV teacher?
 a) yes = 1 response
 b) no = 2 responses

19. What are the THREE most important ways that tele-teaching is different from regular classroom teaching?

 1. Teacher has to be better prepared. = 2 responses
 2. Results in increased time on task. = 2 responses
 3. Teacher classroom mobility is restricted. = 2 responses

Answer the questions below, based on the following five point scale:

Strongly Disagree — Strongl Agree

1 2 3 4 5

20. Tele-teaching technologies will replace regular classroom teachers.
Avg. = 2.25

21. Preparing lesson materials for delivery via tele-teaching technologies is much more time consuming than preparing lessons for regular teaching. Avg. = 3.5

22. Students in my tele-course(s) are assigned as much homework as students in regular classes. Avg. = 5

23. Student cheating on tests or assignments occurs very infrequently in my tele-course(s). Avg. = 4.5

24. Students at different sites frequently interact (exchange questions, comments, or otherwise talk back and forth with each other) during my tele-course(s). Avg. = 4.25

Regular Teacher Questionnaire
(26 returned)

Distance Education Study
- United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer fo each of the following questions.

1. Are you aware that "distance education" courses are being taught in your school?
   a) yes = 26 responses
   b) no = 0 responses

2. Have you ever observed the distance education class(s)?
   a) yes = 15 responses
   b) no = 11 responses

   If yes, how would you rate the quality of instruction provided students (on a 5 point scale where "1" is "poor" and "5" is "excellent")? Avg. = 4.31

3. Have you taken any inservice training courses at your school that have been presented in a "distance education" delivery mode?
   a) yes = 7 responses
   b) no = 19 responses

   If yes, a) ESTIMATE the number of courses. Avg. = 2.6 courses

   b) Rate the quality of training presented (on a 5 point scale where "1" is "poor" and "5" is "excellent") Avg. = 3.66

   c) Did you interact with the tele-teacher during a course?
      a) yes = 1 response
      b) no = 6 responses

   d) Did you interact with other teachers at your site during a course?
      a) yes = 5 responses
      b) no = 2 responses

   e) Did you interact with other teachers at other sites during a course?
      a) yes = 0 responses
      b) no = 7 responses

4. Which type of inservice classes do you prefer?
   a) traditional inservice with an on-site trainer/instructor = 12
   b) training delivered via one-way TV. = 2

5. During a typical inservice training program presented over your school's two-way TV system, ESTIMATE the number of actual trainer/teacher interactions that actually occur. Avg. = 4.6

Based on your knowledge of tele-courses offered to students at your school, answer the questions below, using the following five point scale:

Don't Know	Strongly Disagree				Strongly Agree
0	1	2	3	4	5

6. Tele-courses appear to be more difficult than traditional courses. Avg. = 2.4

7. Students would do better in a traditional setting. Avg. = 2.95

8. Students would rather take a tele-course than a course in a traditional setting. Avg. = 2.5

9. The tele-teacher seems to be personable with students (seems to convey a feeling of caring about students). Avg. = 4.29

10. The tele-courses will help students at our school get into college. Avg. = 3.91

11. Students typically have to work harder during a tele-course than in regular classes. Avg. = 2.38

12. Only certain students at this school are allowed to take a tele-course. Avg. = 2.52

13. Offering courses via tele-teaching will significantly reduce job opportunities for regular classroom teachers. Avg. = 2.36

14. Would you like to teach a tele-course?
   a) yes = 4 response
   b) no = 14 responses

15. What are the two or three major strong points of the TV teaching in your school?

    1. Ability to expand the curriculum. = 22 responses
    2. Opportunity for college credit. = 5 responses
    3. Interaction with other schools and students. = 2 responses

16. What are the two or three major weak points of the satellite teaching in your school?

    1. Expensive. = 3 responses
    2. Minor technical problems. = 3 responses
    3. Discipline problems. = 2 responses

17. ESTIMATE the number of times you have observed instruction on the tele-system in your school. Avg. = 2.2 times

Facilitator Questionnaire
(8 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you certified to teach in the subject being offered?
   a) yes = 1 response
   b) no = 7 responses

2. How many tele-courses do you oversee? Avg. = 1 course

3. Are tele-courses at your school mostly geared for
   a) remedial students? = 0 students
   b) average students? = 4 students
   c) advanced students? = 5 students
   d) other? = 0 students

4. Is the tele-system used for teacher in-service training?
   a) yes = 7 responses
   b) no = 1 responses

5. ESTIMATE the total number of hours you spent training for your tasks in the tele-classroom. Avg. = 4.4 hours

6. ESTIMATE the total number of times students in an average satellite class talk to the tele-teacher each week. Avg. = 66 times

7. ESTIMATE the average number of students in a tele-class at your site. Avg. = 6 students

8. ESTIMATE the average number of students in an entire tele-class (including all sites). Avg. = 18 students

Answer the questions below, based on the following five point scale:

	Strongly Disagree				Strongly Agree
	1	2	3	4	5
9. Tele-courses appear to be more difficult than traditional courses.	Avg. = 2.25				

10. Students would do better in a traditional setting. Avg. = 2.38

11. Students would rather take a tele-course than a regular course. Avg. = 2.88

12. The tele-teacher seems as knowledgeable as the regular teachers in this school. Avg. = 4.63

13. I can easily contact the tele-teacher if I need to. Avg. = 4.88

14. The tele-course will help students get into college. Avg. = 4.63

15. Students have to work harder during a tele-course. Avg. = 2.63

16. Only certain students at this school are allowed to take a tele-course. Avg. = 3.13

17. Homework assignments are returned to the tele-students more slowly than to the regular students. Avg. = 2.5

18. The tele-teacher can recognize the students' voices and call them by name. Avg. = 4.88

19. The tele-teacher asks more questions than a regular teacher would. Avg. = 2.63

20. Student cheating on tests or assignments occurs very infrequently in this tele-course. Avg. = 4.25

19. What are the system's strong points?

    1. Ability to expand the curriculum. = 7 responses
    2. Likelihood for new student friendships. = 3 responses
    3. Possibility for increased interaction. = 2 responses

20. What are the system's weak points?

    1. Minor technical problems. = 4 responses
    1. Scheduling conflicts. = 2 responses
    2. Some teachers are slow to accept it. = 4 responses

Student Questionnaire
(44 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. What year are you in school?
   a) 9th grade = 1 student
   b) 10th grade = 8 students
   c) 11th grade = 14 students
   d) 12th grade = 21 students
   e) other (explain) = 0 students

2. ESTIMATE your grade point average for the past three years.
   a) "A" student = 15 students
   b) "B" student = 19 students
   c) "C" student = 10 students
   d) "D" student = 0 students

3. If you had a choice between enrolling in a tele-course or taking the same course in a regular classroom, which would you choose?
   a) regular class = 13 responses
   b) tele-class = 28 responses

4. Are you taking this course for Advanced Placement?
   a) yes = 20 responses
   b) no = 24 responses

5. How many tele-courses are you enrolled in? Avg. = 1 course

Answer questions 6, 7, 8, 9 and 10 for your most enjoyable TV course. (If you are enrolled in only one course, then answer for that course.)

6. ESTIMATE the number of times during the last week that you contacted your "tele-teacher". Avg. = 16 times

7. ESTIMATE the number of times during the last week that your "tele-teacher" contacted you. Avg. = 10.5 times

8. Is this class an elective or is it required?
   a) elective = 40 responses
   b) required = 4 responses

9. How many students are in the class at your site? Avg. = 6 students

10. ESTIMATE the number of students in the entire class (including all sites). Avg. = 20 students

Answer the questions below, based on the following five point scale:

Don't Know	Strongly Disagree				Strongl Agree
0	1	2	3	4	5

11. Tele-courses are more difficult than regular classes taught in school. Avg. = 2.35

12. I could make a better grade if the course was taught in a regular setting. Avg. = 1.89

13. I've gotten to know the students in my tele-course as well as the students in my regular classes, even though my tele-classmates are farther away. Avg. = 3.31

14. I work more closely with the students in my on site tele-class than with students in my regular classes. Avg. = 2.67

15. My tele-teacher is as friendly to me as most regular teachers in my school. Avg. = 4.32

16. I can easily contact the tele-teacher to ask questions or make comments if I want to. Avg. = 4.14

17. The tele-course(s) I am taking will help me get into college. Avg. = 3.92

18. I have to work harder in my tele-course than I do during a regular class. Avg. = 2.79

19. Only certain students at my school get to take a tele-course. Avg. = 2.56

20. Homework assignments are returned more slowly in tele-courses than they are in most of my regular classes. Avg. = 3.14

21. The tele-teacher knows all of the students at my site by name. Avg. = 4.84

22. The tele-teacher asks more questions during class than most regular teachers do. Avg. = 3.19

23. What are the three best things about a tele-course?

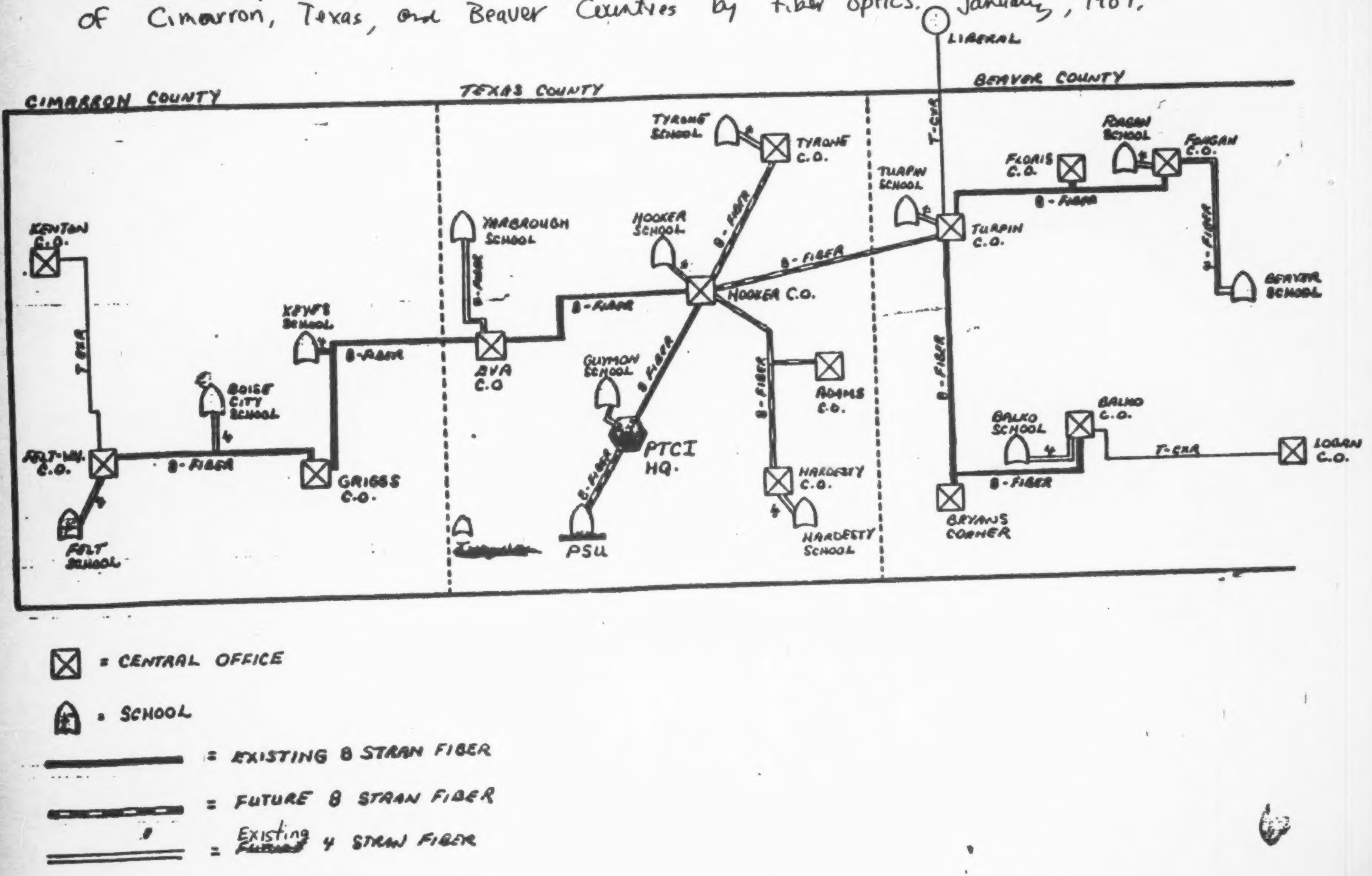
    1. Ability to interact with students at other schools. = 37 responses
    2. Ability to expand the curriculum. = 27 responses
    3. Exciting new concept. = 17 responses

24. What are the three worst things about a tele-course?

    1. Minor technical problems. = 16 responses
    2. Sometimes cannot hear other schools. = 15 responses
    3. Teacher is not always available. = 8 responses

APPENDIX F

Long range plan by Panhandle Telephone Co-op, Inc. to link the school districts of Cimarron, Texas, and Beaver Counties by fiber optics. January, 1989.


LIBERAL
CIMARRON COUNTY
TEXAS COUNTY
BEAVER COUNTY
KENTON C.O.
T-CXR
FELT-WH. C.O.
FELT SCHOOL
4
8-FIBER
BOISE CITY SCHOOL
GRIGGS C.O.
KEYES SCHOOL
8-FIBER
YARBROUGH SCHOOL
8-FIBER
EVA C.O
8-FIBER
HOOKER SCHOOL
HOOKER C.O.
TYRONE SCHOOL
TYRONE C.O.
8-FIBER
8-FIBER
GUYMON SCHOOL
PTCI HQ.
8-FIBER
8-FIBER
PSU
8-FIBER
ADAMS C.O.
HARDESTY C.O.
HARDESTY SCHOOL
TURPIN SCHOOL
TURPIN C.O.
T-CXR
FLORIS C.O.
FORGAN SCHOOL
FORGAN C.O.
8-FIBER
8-FIBER
BEAVER SCHOOL
8-FIBER
BALKO SCHOOL
BALKO C.O.
T-CXR
LOGAN C.O.
8-FIBER
BRYANS CORNER
= CENTRAL OFFICE
= SCHOOL
= EXISTING 8 STRAN FIBER
= FUTURE 8 STRAN FIBER
8
= Existing 4 STRAN FIBER

Appendix G

Information contained in this case study was obtained via printed materials supplied by administrators from the panhandle area schools, from survey data submitted by each of the four schools during January 1989, and from on-site interviews and class observations with the following individuals on the dates listed below:

January 25, 1989

Doug Rundle
Superintendent
Forgan Public Schools
Box 406
Forgan, Oklahoma 73938

Travis Wilson
Counselor & Community Education Coordinator
Forgan Public Schools

Troy Bowles
Principal
Forgan Public Schools

Delores Hegglin
Spanish Language Teacher
Forgan Public Schools

Selected Students in TV Spanish Language Class
Forgan Public Schools

Roger Hilton
Principal
Beaver High School
Beaver, Oklahoma

Cheryl Melton
Advanced Placement English Teacher
Beaver High School

Selected Students in TV Art Class
Beaver High School

Janell Edwards
TV Classroom Facilitator for TV Art and Elementary
Teacher
Beaver County School District

January 26, 1989
Richard Boothby
Superintendent
Balko Public Schools
Route 1, Box 37
Balko, Oklahoma 73931

Jim Bouse
Superintendent
Beaver Public Schools
807 Avenue G
Beaver, Oklahoma 73932

Gerald Danley
Superintendent
Turpin Public Schools
Box 187
Turpin, Oklahoma 73950

Dick Robinson
Art Teacher
Turpin Public Schools

Ron Strecker
Business Administration Supervisor
Panhandle Telephone Cooperative
Box 1188
Guymon, Oklahoma 73942

Revised Copy
May 1989

THE NORTHEASTERN UTAH TELELEARNING PROJECT: A "MIXED BAG" OF DISTANCE LEARNING TECHNOLOGIES THAT HAVE BEEN MERGED TOGETHER

Background Information

The Uintah Basin Area Vocational Center (UBAVC) in Roosevelt, Utah is one of five state vocational technical centers operated under the authority of the Utah State Board of Vocational Education. The UBAVC serves the vocational/technical education needs of secondary and adult students from all cultural and academic backgrounds living in the Northeastern Utah area comprised of Daggett, Duchesne, and Uintah Counties -- a sparsely populated geographical region covering slightly under 10,000 square miles of area. Most of the area is situated within the boundaries of a great basin, known as the "Uintah Basin," the result of a prehistoric lake that once covered portions of northern Utah. The area is also the ancestral home of the Ute Indians who still occupy a large reservation in the region. The Uintah Mountains, America's only mountain range that runs east and west, form the basin's northern boundary. Portions of the country encompass Utah's famous Dinosaur National Monument. This is an area of the state that has traditionally been known for its agriculture and cattle production. Fishing and hunting opportunities also abound. Since the 1960's, oil extraction has been an important industry.

The major purpose of the UBAVC is to provide vocational and technical training that will prepare individuals for initial employment, upgrade their existing job skills, or retrain them for new career fields not requiring a baccalaureate degree. Most programs and classes are offered in residence at the Center. Over the past four years, however, a few classes have been offered via distance learning to schools in the Center's service area. A variety of technologies have been used including wideband microwave, UHF television, public television, microcomputer audiographic networking, and facsimile transfer. By partnership agreements with the Utah State Office of Education, Utah State University, the University of Utah, the Northeastern Utah Educational Service Center and school districts in Daggett, Duchesne, Rich and Uintah Counties, the UBAVC has been able to assist rural schools in meeting educational challenges.

Within one-half mile from the UBAVC, Utah State University (USU) Extension Services operates a Uintah Basin branch campus. Several USU professors teach college level classes at the branch campus which are transferable to USU's central campus in Logan, some 250 miles to the northwest.

USU professors are frequently contracted with the UBAVC to teach classes for the Center.

Educational Context and Community Served

The UBAVC at Roosevelt is located about 150 miles east of Salt Lake City. The Center serves both secondary and adult learners. Most programs, however, are geared for post high school students who have remained in the area and now seek training for specific job skills. Specialized certificate programs -- some allowing for college credit -- are offered in the subject areas of allied health (licensed practical nurse and emergency medical training), business (accounting clerk, business manager, clerk typist/receptionist, computer applications, legal secretary, etc.), early childhood development, and in the various trades (welding, architectural drafting, mechanical drafting, auto mechanics, petroleum technology, etc.) In addition to its work with adult learners, the Center has also taken the responsibility to offer several advanced level courses via telecommunications to secondary students in its service area.

The Northeastern Utah Telelearning Project began in 1985 on a one-year pilot basis between the UBAVC and three local schools (Tabiona, 75 miles to the west; Rich, 206 miles to the north, and Manila, 70 miles to the northeast. The pilot project was endorsed by the Utah State Office of Education and the Northeastern Utah Educational Services Center. All classes originated from the UBAVC at Roosevelt. The three schools were linked with the UBAVC by means of a microcomputer audiographics network over dedicated telephone lines. Three classes were taught the first year.

The project was expanded the second year (1986-87) to include four more schools (Altamont, 18 miles to the northwest; Duchesne, 30 miles to the southwest; Thompson, five miles west; and Union High School, directly across the street from the vocational center. Approximate total student enrollments at the schools and grade levels served is as follows: Altamont, grades 7-12, 300 students; Duchesne, 7-12, 314; Manila, 7-12, 67; Rich, 9-12, 130; Tabiona, 7-12, 100; Thompson, an ungraded alternative school which serves only behavioral disordered children, 23 students; Union, 10-12, 580. Seven classes were taught during the second year and duplex television (two-way TV) capabilities were also added to one school site. In its third year of operation (1987-88) a UHF (ultra high frequency) channel permitting simplex television (one-way TV) was added to four sites on the network. In 1988-89, facsimile machines were added at each site (see Appendix A for a schematic depiction of technologies at individual sites).

Factors which led to UBAVC's development of the Northeastern Utah Telelearning Project included (Miller, 1988):

1. Geographical isolation of schools within the service area of the UBAVC.
2. Decreased funding from state and local sources, but increased graduation requirements with stricter graduation guidelines.
3. Availability of appropriate technologies and people interested in learning how to utilize the technologies within the constraints of limited funding and existing school systems.
4. Desire and support of local school district administrators to promote a telelearning system to their schools.
5. A declared need to provide increased educational opportunity to rural school students in the area.

Description of Technology Utilized and Programming Provided

A combination of technologies are used by the UBAVC to deliver distance education offerings to the seven area schools presently served. Use of these technologies by the UBAVC evolved over a four year period. According to Douglas Jones, Director of Learning Services for KUED Channel 7 (the University of Utah's Public Broadcasting Station), "Program administrators [at the UBAVC] have a menu of several technologies that can be called upon. Each developed individually and can be independent of one another, but fortunately they are compatible and can also be used together."

The first was a microcomputer and audio system hookup that used dedicated telephone lines. Audiographics software produced by Wasatch Backboard System of Salt Lake City linked microcomputers for visual exchange of graphics and textual information between a host microcomputer at UBAVC and microcomputers at the three schools linked to UBAVC. Audio interaction between teachers and students was over a second set of dedicated phone lines.

In the second year of operation (1986-87), UBAVC expanded the audiographics network to three more area schools and began using a portion of the state's broad-band microwave telecommunications system known as EDNET. EDNET is an interactive (two-way, full-motion) video and audio, closed-circuit microwave television system that presently reaches 15 key population centers throughout the state. Three EDNET sites -- Roosevelt, Manila, and Vernal -- are in the UBAVC's service area. EDNET's main purpose is to distribute university and K-12 courses, vocational education and medical care instruction to communities who might not otherwise have access to quality instruction. EDNET is also used for administrative meetings and statewide inservice training sponsored by the Utah State Office of Education. Hence, as configured during the second year, distance learning courses were delivered from UBAVC in an audiographics format via dedicated telephone lines to Rich, Altamont, Tabiona, Duchesne, and Thompson schools. Union High School students at Roosevelt walked across the street from the high school and attended courses in the classroom/studio. The students at Manila High School were connected with all of the other schools via the audio hookup and with UBAVC via duplex television delivered between Roosevelt and Manila over EDNET. During that same year, Manila and Roosevelt discontinued use of dedicated telephone lines and took advantage of multiplex sideband frequencies and codec devices to transmit, via microwave, audio and computer graphics between the two schools. To date, no distance education classes have been offered between the Roosevelt and Vernal EDNET sites.

In the third year, George Miller, Northeastern Utah Telelearning Project coordinator, learned through contact with officials at KUTV-Channel 2 (the NBC affiliate) in Salt Lake City that an Ultra High Frequency (UHF) translator located on Tabby mountain, 60 miles northwest of Roosevelt was not being used. Administrators at the Northeastern Utah Educational Service Center negotiated with KUTV to purchase the translator and necessary broadcast equipment for $5000. Consequently, simplex television is now broadcast from Channel 61 originating at the UBAVC in Roosevelt to Altamont, Tabiona, Duchesne, and Thompson schools. In fact, the signal actually covers several hundred square miles and is received in over 5000 homes in northeastern Utah. In addition to audiographics via microcomputers, distance education students at these five schools are now permitted a one-way, full-motion video presentation of classes broadcast from UBAVC. Audio interaction is via an audio bridge, operated by U.S. West, over the dedicated telephone lines

In the fourth year of operation (1988-89), facsimile machines were added at each of the sites. Technologies presently in use over the network are depicted in Appendix A.

The UBAVC at Roosevelt serves as the broadcast center for all classes delivered over the network. All sites are connected with the UBAVC by means of either dedicated telephone lines, UHF signals, and/or microwave signals. A Darome audio bridge at UBAVC links all sites together for audio communication.

Program Offerings

Six and one-half hours of high school and/or college programming (concurrent enrollment) is generated each weekday from the Center. In the last four years 19 different credit courses for students have been offered over the network. Advanced Placement English, Advanced Placement History, and Chemistry/Physics were taught during the network's pilot year of operation. During the second year, offerings were expanded to a three quarter hour mathematics sequence taught through Utah State University Extension Services and offered for concurrent enrollment (both high school credit and college credit), a three-quarter hour English/history sequence from USU Extension Services offered for concurrent enrollment, a one-semester junior high art class (during one semester the class was provided to 7th graders and during the second semester it was offered to 8th graders), a one-year Physics class, a one year Principles of Technology class, a one-year Technical Writing class, and a one-year German language class (Gardner and Della-Piana, 1980). For the third and fourth years, program offerings have included German I, Chemistry, and Physics, and concurrent enrollment college credit courses from the Utah State University Extension Services in Algebra, Calculus, English, Art History and Criticism, Computer Applications in Business.

Delivery of the Computer Applications in Business course, taught as a concurrent enrollment college credit class from USU Extension Services is especially unique. The class is taught live at the UBAVC classroom/studio in Roosevelt where it is simultaneously received by all participating high schools (except Rich) in its service area. At the same time, the signal is also broadcast via microwave over EDNET to the University of Utah's public television station, KUED in Salt

Lake City. KUED rebroadcasts the signal immediately (live) to a six state viewing area in a one-way TV (simplex television) format to a potential viewing audience of thousands. In the evenings the class is rebroadcast yet again over KULC, the University of Utah's second public television station. In this manner, individuals who could not view the program over KUED when it was broadcast live, are able to see it on KULC. For the Fall 1988 quarter, 270 students in 11 different school districts across the state enrolled for credit. The course is offered for credit in a Telecourse format, similar to a correspondence study model. That is, students watch TV lessons, complete assignments that are submitted via the mail to UBAVC where they are picked up and graded by the USU Extension Services professor. Credit is granted on the basis that students successfully complete homework assignments and pass tests which are administered at approved testing locations around the state. Offering classes for credit outside the UBAVC service area has necessitated a cooperative arrangement between UBAVC, the Utah State Office of Education, Utah State University, the University of Utah, and the Northeastern Utah Educational Service Center.

Of the 1500 high school students in the UBAVC's service area, program administrators estimate that over 100 students will benefit from telelearning classes each year. During the last four years, over 400 students have taken distance learning courses. Many students have completed anywhere from three to 15 quarter hours of college credit course by means of the concurrent enrollment option. These credits are fully accepted by Utah State University or can be transferred to any of the other state sponsored institutions of higher education in Utah.

No elementary programming has been produced or presented from the Center, nor are there any immediate plans to add elementary programming. A junior high school art course was offered to 7th and 8th graders during the project's second year. School administrators, however, felt that most participating students did not actively benefit from the course. Accordingly, programming for junior high school students has been discontinued. Only specialized classes or advanced classes are offered over the network, not basic classes. As a result, the area's small schools are presented with a variety of classes that would not otherwise be offered to their students.

Over a four year period, the Center produced and delivered only two inservice sessions for regular teachers. However, the Utah State Office of Education or one of the state's universities, periodically deliver inservice programs via EDNET which can be received directly at Roosevelt and at Manila in a duplex TV modality. From Roosevelt, the EDNET signal is redirected to the UHF translator on Tabby Mountain and delivered to Tabiona, Thompson, Altamont, and Duchesne via UBAVC's channel 61 in a simplex TV mode.

Organization Structure and Program Costs

Of the Uintah Basin Area Vocational Center's 26 full-time employees, two are assigned to the Northeastern Utah Telelearning Project. A project coordinator administers the program and supervises the activities of a studio/manager technician and five part-time employees, mostly high school or vocational center students who help operate cameras, assist in clerical work, and perform other tasks as required. The vocational center students who work with the project receive federal work-study assistance.

According to George Miller, project coordinator, "The UBAVC has looked to establish relationships across government, political, and institutional boundaries to make the program a success". Key partners with UBAVC have been the Utah State Office of Education, the Northeastern Utah Educational Services Center (NUES), KUED Channel 7 at the University of Utah, Utah State University Extension Services, the Duchesne School District, and the participating schools in the Uintah Basin. The roles of each agency/institution vary.

The Utah State Office of Education is the funding entity for virtually all K-12 monies appropriated by the state legislature. All grants from the state legislature to support the UBAVC's telelearning project have been supplied by the State Office of Education through applications submitted to the Northeastern Utah Education Service Center. The Northeastern Utah Education Service Center services K-12 public schools in 11 districts in Northeastern Utah. It is located in Heber City some 110 miles west of Roosevelt. Three of the 11 districts served by NUES (Duchesne, Daggett, and Uintah) also fall under the jurisdiction of the UBAVC. As a result, UBAVC has developed a close working relationship with NUES to deliver telelearning courses to high schools that fall under the service area of both agencies.

Duchesne School District serves as the fiscal agent for all telelearning programming costs incurred by UBAVC to participating high schools in the network. Costs for camera operators, fax, postage, teleteachers and other related programming fees are maintained by the telelearning project coordinator at UBAVC. All costs are pro-rated, based on the number of students participating at each school. An exact breakdown of expenses to participating schools is supplied on a semester basis to Duchesne School District. The district bills and collects monies from each individual school then forwards the money to the UBAVC.

Program Costs and Funding Sources

Initial funds in the amount of $103,000 were provided by the Utah State Office of Education and IBM Corporation to the Northern Utah Educational Service Center in Heber City to purchase equipment, telecommunications software, audio teleconferencing devises, install dedicated telephone lines and to pay for inservice training of teachers and classroom facilitators who would use the system.

Equipment needs at each school for the audiographic linking include an IBM PC XT microcomputer with 640 kb RAM memory, one Hayes 1200 baud internal modem, a color monitor (RGB capable that handles 640 x 400 resolution video), a graphics tablet with a pen stylus, and a Darome 2-wire convener system with single push-to-talk microphone. Telecommunications software was developed by Wasatch Blackboard System of Salt Lake City for about $2000 per site. In total, individual costs per site to install dedicated telephone lines, purchase equipment and software ranged between $6000 to $8000. At Roosevelt, an IBM AT microcomputer is used with a multi-port card with a sufficient number of inputs to match the number of remote sites connected to the network. A maximum of any five sites can be accessed at one time. Hayes 1200 baud external modems, one for each remote site, are also required at Roosevelt. Appendix B provides an overview of basic audiographics equipment needs at the Roosevelt teaching site and each of the remote receiving sites.

Essential equipment items to operate the simplex and duplex TV components from Roosevelt are two Sony CCD cameras with camera mounts, tripod and dolly, 3/4 inch video tape player, three line monitors, frame synchronizer, studio intercoms, computer graphic generator, video switcher, telephone networking system, computer networking system, facsimile transfer equipment, microwave transmission equipment and a UHF transmitter (Miller, 1988). There are no dedicated telephone lines between Roosevelt and Manila for the duplex TV component. All voice, data, and video communication is over microwave. A multiplexer is used to "mux" voice data transmissions when using audiographics. Otherwise, interaction between the two sites is two-way full-motion. The Manila site has a regular TV monitor. The multiplexer is a small switching mechanism which automatically switches between voice, video and/or data transmissions. The initial cost of the multiplexer was $300. Its use has nullified the need for dedicated phone lines between Manila and Roosevelt.

Dedicated telephone lines are maintained between Roosevelt and the four sites (Altamont, Thompson, Duchesne, and Tabonia) receiving simplex TV over UHF Channel 61. The phone lines are needed for audiographic communications to Roosevelt in the one-way video, two-way audio interactive mode over simplex TV. For simplex TV reception from Channel 61, each of the four schools have a regular 25" TV monitor. The cost to the schools range between $400 - $800.

UBAVC's use of the EDNET microwave system costs the Center $30.00 per hour. EDNET was set up among selected Utah communities several years ago by a $500,000 grant from the National Telecommunications Information Agency (NTIA). The installation charges for the Roosevelt and Manila EDNET sites were borne by funds received through NTIA. For the Computer Applications in Business course which is carried from Roosevelt to Salt Lake City over EDNET then redistributed by KUED, the Utah State Office of Education pays the $30.00 per hour use fee. UBAVC pays no maintenance fee for EDNET. The only charges are for a $30.00 per hour use fee.

Channel 61, the UHF frequency used for simplex TV instruction emanating from Roosevelt to four sites, was purchased for $5000 from KUTV-Channel 2 in Salt Lake City two years ago. UBAVC pays a $100 monthly maintenance fee to Uintah County to keep the UHF translator on Tabby Mountain operational. Acquisition of a UHF channel by an educational institution for only $5000 is unusual. The likelihood that such action could be duplicated elsewhere is somewhat remote.

For program cost accounting purposes, UBAVC has determined a set $10 per hour fee to cover camera operation, UBAVC personnel costs, postage, fax machine, and other incidental expenditures associated with operation of the project. The $10 per hour operation fee does not include salaries of teachers. Salaries for USU Extension Services professors teaching concurrent enrollment courses are paid by USU and not charged to the schools. Salaries for local teachers (Art History and German language) are shared among users. The Art History teacher, for example, is paid $5000 for the one course that she teaches. The Chemistry course is taught by salaried personnel at UBAVC for which a fee of $16.00 per hour is charged.

Other than operational costs incurred by UBAVC, neither students nor schools are charged an annual subscription fee. Tuition costs for students enrolled in concurrent enrollment courses from Utah State University is shared between the students, the local school, and USU. One-third of the tuition is paid by the student, one-third by the school, and the remaining third is absorbed by USU.

Role and Responsibility of Individual Schools

The UBAVC studio/classroom opens at 8:00 am each school day. The equipment is checked and operated briefly to insure reliability. Remote site schools are contacted over the dedicated phone lines to make certain they are operational for the day. Classes begin at 8:45 a.m. and continue throughout the day.

During instruction, a classroom coordinator/facilitator at each remote site is responsible to set up and operate the telelearning equipment and handle the non-instructional duties in the classroom such a attendance, arrangement of desks, mailing/faxing materials, etc. Under the direction of the teleteacher, they might also perform grading, filing, and recording tasks and otherwise facilitate student involvement in the telelearning experience. One of their key assignments is to maintain student discipline while instruction is taking place. The classroom facilitators are hired by each school principal. They do not need to be certified teachers. In some instances, certified teachers on their preparation hour have assumed the duties of the classroom facilitator. When this has happened, they receive 1/7 extra salary as compensation, paid by their school (Miller, 1986). Most who serve are teacher aids.

Most student homework, assignments, and tests are routed by fax machines from each school to the studio/classroom at Roosevelt. Student materials that extend beyond 4-5 pages per student, however, are sent via the mail. UBAVC pays for postage of any materials leaving the Center to the schools. Likewise, the schools pay postage for items sent to Roosevelt. The schools are also responsible for purchase of texts and other instructional materials.

Program offerings are determined in the Fall of each year for the upcoming year. Project administrators hold a planning meeting with superintendents and principals of the area schools to assess needs and plan a schedule of classes for the next year. At this meeting discussions are held to resolve conflicts such as bell scheduling, course fees, and evaluation of teachers. This is done in ample time to allow schools to register students and schedule class offerings. UBAVC personnel are then able to arrange for telelearning teachers to teach the desired classes. According to George Miller, "The main thing that drives the network are the needs of the schools, not what we [the UBAVC] need. We encourage the schools to let us know what they need, then we will try to provide it."

Policies for student absenteeism are established by the local schools. Each of the simplex and duplex TV sites has a videotape recorder available. Each site is encouraged to videotape whenever a student is absent or a schedule conflict (eg. school assembly, sport activity, etc.) prevents student attendance. If the local school does not tape a class, and a tape is needed, UBAVC will send a tape out as soon as possible via the mail.

Of the eight teachers who have taught on the system, three hold doctorate degrees and the rest have masters degrees. Occasional visits are made by teleteachers to students in the remote site locations for socialization and get-acquainted purposes. Teleteachers have also been encouraged by UBAVC administrators to try to have at least one joint outing sometime during the school year when all students in their telelearning class can be together to know other classmates and the teleteacher. This has not been consistent and is somewhat infrequent, largely due to the fact that (1) all classes are taught on a daily basis, and (2) all instruction originates from Roosevelt. Classroom facilitators at the remote sites are encouraged to maintain close contact with the teleteachers to help meet the needs of students.

Because of the various technologies operating between the schools, the level of interaction between the teleteacher and remote students differs between sites. All are linked with audiographic capabilities which allows for real-time exchange of computer created visuals (text and graphics). In addition, duplex TV via EDNET between Roosevelt and Manila permits two-way full-motion TV. Simplex TV over Channel 61's UHF frequency allows for one-way full-motion from Roosevelt to Tabiona, Duchesne, Altamont, and Thompson schools. Students taking courses at Rich High School are the only ones who do not see their teacher. For them, the only technology available is audiographics. (See Appendix A for a schematic of interactive technologies between sites.) Students from Union High School who participate in the Project's classes all attend the studio/classroom. They are taught in a traditional setting by the teleteacher. The only difference is that a technician operates a TV camera in the back of room focused on the teacher and, except for those classes in which students from Manila are enrolled, contact with distant classmates is only by means of voice interaction. A bridge network at Roosevelt enables students to talk freely with the teacher as well as with students at any site. To speak, students at any of the sites merely push a press-to-talk microphone that carries their voice over the entire system. The teleteachers do not hold formal office hours for students to call in to ask questions or seek counsel.

Project administrators admit that one of the biggest problems in trying to work with the seven schools is bell scheduling. There is no common bell schedule. According to George Miller, "This [bell scheduling] has been a really tough problem for us. It is one that we have not been able to resolve. The schools do not have a common clock; and different starting times for elementary classes, lunch schedules, and bus arrivals and departures are all factors that impact on scheduling of high school classes."

A related concern is lack of administrative support from a few principals in some of the schools. Some principals are very enthusiastic while others are described as "luke warm." Those who are luke-warm do not promote courses, restrict student enrollment in courses, and are reluctant to hire teacher aids to act as classroom facilitators.

Evaluative Data

Of the more than 400 students participating in telelearning classes during the first three and one-half years of the project, six have qualified as Sterling Scholars in Utah and have received $1000 academic scholarships (Miller, 1988). Miller also reports, "One young man at Manila High School was enrolled in six teleclasses last year and for 1988-89 is enrolled in three. He will graduate from high school one year ahead of his classmates and will have 25 quarter hours of credit from Utah State University, earned at a very reduced cost, while 250 miles from the nearest college.

Two successive external evaluations of the project, in 1986 and 1988, have been conducted by researchers at the University of Utah (Gardner and Della-Piana, 1986 and 1988). The 1986 study focused only on the audiographics network between the initial three schools. The report recommended that the total enrollment in any single telelearning class not be allowed to exceed 25 students and that enrollment be restricted to students with sufficient academic preparation. The report's overall evaluation stated:

> We have been impressed with tele-learning in the Northeastern Education Services area. The program is clearly in the formative stages, and there are a number of areas that will need to be improved...the tele-learning system works well and is reasonably well received by students. It's strong points are its use of computer graphics, its ability to reach geographically isolated students, and its ability to provide qualified instruction in advanced areas when such instruction normally would not be provided (due to a lack of qualified faculty at the remote school). It is not, however, a panacea. It is not superior to a traditional class taught by a qualified teacher, and we have gone to pains to point out that it should be used to enhance curricular offerings, and not to replace qualified teachers in core areas.
>
> When used as a curricular enhancer, it has tremendous potential. Students in small, rural schools, who would otherwise find themselves at an education disadvantage, can close the gap between themselves and their counterparts in larger urban and suburban schools. Upon college entry, rural students who have engaged in tele-learning should have far less "catching up" to do. We do not

> believe the value of tele-learning is limited to the college bound students either. Students who wish to pursue careers in vocational/trade areas (eg. agriculture) should also be able to enhance their high school training through courses taught via tele-learning. The potential exists to serve a wide range of the community through this program.
>
> Tele-learning is a program with a bright future. (pp. 63-64).

The second study noted that the project had made considerable progress in a two year period, had grown to additional schools, had incorporated new technologies, and had improved itself from the viewpoint of students (Gardner and Della-Piana, 1988).

During interviews, one student reported, "The teacher brings more insight into the discussion because you are hooked-up to other schools. You get a better perspective on the material." Another said she liked the classes because, "It lets you get college credit while you are still in high school." A local principal at Altamont High School said, "This program provides for a more qualified teacher in some of our more specialized classes than we might normally be able to provide in our small school."

Survey Data

A total of 98 questionnaires were returned. These included six administrators, five tele-teachers, 15 regular classroom teachers (teachers not directly involved with the tele-teaching system, eight classroom facilitators and 64 students. Refer to Appendix D for a detailed summation of survey result.

Responses From Administrators

The average enrollment of the schools was 237 students. Of this total, an average of 13 students at each site were taking one or more tele-courses. The administrators said that they spent an average of 15 hours the previous semester evaluating the tele-courses. They agreed that the quality of the tele-teaching was as good as the quality of the regular teaching. The administrators felt that the parents and the school boards in their districts were supportive of the use of tele-teaching. On a scale of "1" equals "poor" to "5" equals "excellent", the administrators rated the quality of student learning via tele-courses at "3.4". They rated the overall benefit of tele-courses to their schools' instructional programs was a "4.7", and felt that tele-courses were cost effective in terms of student learning.

When asked to list the strong points of the tele-learning system, each of the administrators listed expanded curriculum offerings. Two listed the ability to offer college credit courses. Also mentioned was the benefit of having certified teachers. As for weak points of the system, three administrators expressed concern over schedule coordination. One administrator reported that students were getting tired of the system and wanted to check out. Another indicated that the students sometimes had trouble getting in touch with the tele-teacher after class.

Responses From Tele-teachers

The tele-teachers had an average of 13 years teaching experience and their own education level ranged from a bachelor's degree, up to a doctoral degree. They felt that the number of students in their tele-classes was within manageable limits for effective instruction. The tele-teachers reported spending an average of a half hour in preparing a daily lesson plan for a tele-course and estimated that it took three to five days for homework to be graded and returned to the students. They received an average of one telephone call from the parents of students each semester and called parents students an average of once per semester.

None of the tele-teachers felt that tele-teaching technologies would replace regular classroom teachers. They reported that cheating on tests and assignments occurred very infrequently. When asked to describe how a tele-class was different from a regular class, half of the tele-teachers said that the tele-class required better preparation, restricted the teacher's classroom mobility (due to the limited camera range), and resulted in more student time on task. Findings From Regular Classroom Teachers

Twelve of the regular teachers had observed one or more of the tele-classes in progress. On a five point scale where "1" was "poor" and "5" was "excellent", the teachers rated the quality of instruction provided the tele-students at "3.9". One of the teachers had received inservice training over the system and rated the experience at "4".

When asked to list the strong points of the tele-courses, 93 percent of the regular teachers felt that the ability to expand the schools' curriculum offerings was important. Twenty seven percent felt that the opportunity for students to gain college credit via tele-courses was important. Twenty percent said that the exposure to good teachers was important.

As weak points of the system, 33 percent of the regular teachers felt that coordinating the schedules of the participating schools presented problems. Twenty seven percent said that there was less interaction in a tele-class and that it was difficult to find class monitors.

Responses From Facilitators

None of the facilitators were certified to teach in the subject being offered. They had an average of nearly nine hours of training for their position. They said that cheating on tests or assignments occurred very infrequently in the tele-courses. When asked about the system's strong points, 87 percent of the facilitators said that it expanded the school districts' curriculum offerings. Thirty seven percent felt that the increased likelihood for new student friendships was a strong point. Twenty five percent listed the possibility for increased interaction, between students and between school districts.

Responses From Students

If given a choice between taking a regular class or taking a tele-class, 45 percent of the students said that they would take a tele-class. The students estimated that they asked a question or made a comment in the tele-class 11 or 12 times per week, and that the tele-teacher called on the students about six or 7 times per week. When asked to list the system's strong points, 34 percent of the students said that the system's ability to expand the curriculum was important. Thirty percent said that the potential for meeting students and teachers from other schools was important. Twenty percent of the students reported that the system's potential for delivering college credit courses was a strength. As for the system's weak points, 30 percent of the students said that it was difficult to contact the tele-teacher after class and get personalized attention. Seventeen percent said that it took too long to have their homework returned. Sixteen percent mentioned minor technical difficulties.

Plans for Future Development

With six and one-half hours of daily programming, the system is pretty well filled to its maximum. More classes, if added, would have to be scheduled either early in the morning or late into the evening. Project administrators indicate that their desires for the future are to work with teachers to improve the quality of classes taught over the system and to gain broader support among local school administrators. In 1989-90, Art History and Criticism will be added as a concurrent enrollment course from Utah State University Extension Services. The course is to be delivered from UBAVC via EDNET to KUED Channel 7 in Salt Lake City, then redistributed to a six state viewing area.

The Northeastern Utah Telelearning Project is one of three independent, ongoing distance learning projects in the state of Utah. According to Dale Steadman, Technology Specialist with the Division of Research and Development at the Utah State Office of Education, each of the three systems developed on their own. The USOE formed a Distance Learning Unit (DLU), under the Division of Research and Development, in 1988. The several distance learning projects which were already underway have since come under USOE's Distance Learning Unit for overall coordination and monitoring.

According to Steadman, "We [the USOE] are playing catch up."

The DLU organized a distance learning task force in April 1988 to help identify long-range policy. The task force is represented by public educators in both urban and rural settings and by leaders in higher education. The 20 member group has been charged to come up with a master plan for maximizing resources and for looking four to five years into the future to see how the state might best share efforts, expertise, and resources to bring the various distance education programs under one umbrella. The DLU is presently working with the Far West Regional Laboratory to conduct one day workshops involving over 1000 educators in seven different regions. The workshops are designed as data gathering events for educators in public and higher education to look at regional needs in terms of curriculum, teacher inservice training, coordination between administrators and teachers, etc. Findings from the seven "needs gathering workshops" will be used by the distance learning task force to help establish long term policy that best meets the needs of administrators, teachers, and students.

Summary

The Northeastern Utah Telelearning Network began as a microcomputer and speaker telephone linked audiographics network between three schools. Over a four year period the network has evolved to a seven school linkage that includes audiographics, duplex TV over microwave, simplex TV over a low power UHF frequency, and instruction from the state's major Public Broadcasting station. Trying to grasp an understanding of how the system works and the roles of the assorted partners cooperating in the project is complex. The fact that numerous technologies have been successfully merged together over a several year period is certainly an indication that distance education projects might start out on a small scale in terms of equipment and capabilities, then develop in time as resources and/or opportunities permit. Moreover, the success of any distance education project is dependent on the ability of multiple groups to work in harmony to share human and financial resources. According to Doug Jones, Director of Learning Services at the University of Utah, one reason the system works is because "higher education and public education are talking to each other to meet the needs of kids in some of the small schools Utah."

This case study is probably unique in that most schools do not readily have access to microwave networks such as EDNET that are provided by their state. Nor do most rural schools have opportunities to purchase UHF translators from commercial TV stations that are conveniently located in settings that can benefit students. Nevertheless, much can be gained from the Northeast Utah Telelearning Project. Administrators at UBAVC became informed of technologies, grasped opportunities, and formed relationships with officials across institutional boundaries in an effort to provide increased learning opportunities for students.

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George T.W. Miller, Jr. Telelearning Education: A Handbook. (Uintah Basin Area Vocational Center, Roosevelt, Utah, December 1986).

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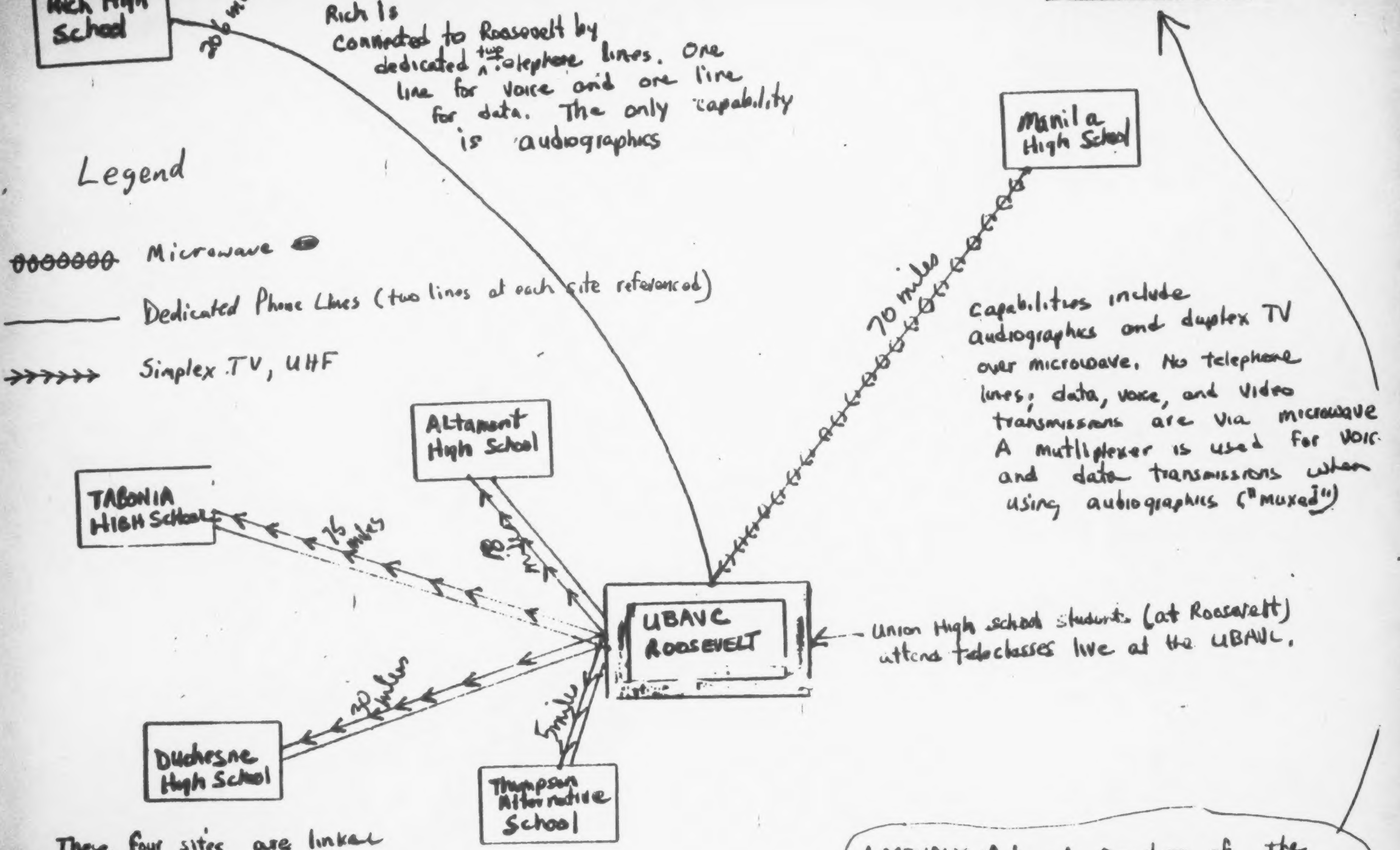
APPENDIX A


Rich High School
30 miles
Manila High School
70 miles
Altamont High School
80 miles
TABIONA HIGH SCHOOL
75 miles
Duchesne High School
30 miles
Thompson Alternative School
5 miles
UBAVC ROOSEVELT
Legend
Microwave
Dedicated Phone Lines (two lines at each site referenced)
Simplex TV, UHF

Rich Is connected to Roosevelt by dedicated two telephone lines. One line for voice and one line for data. The only capability is audiographics

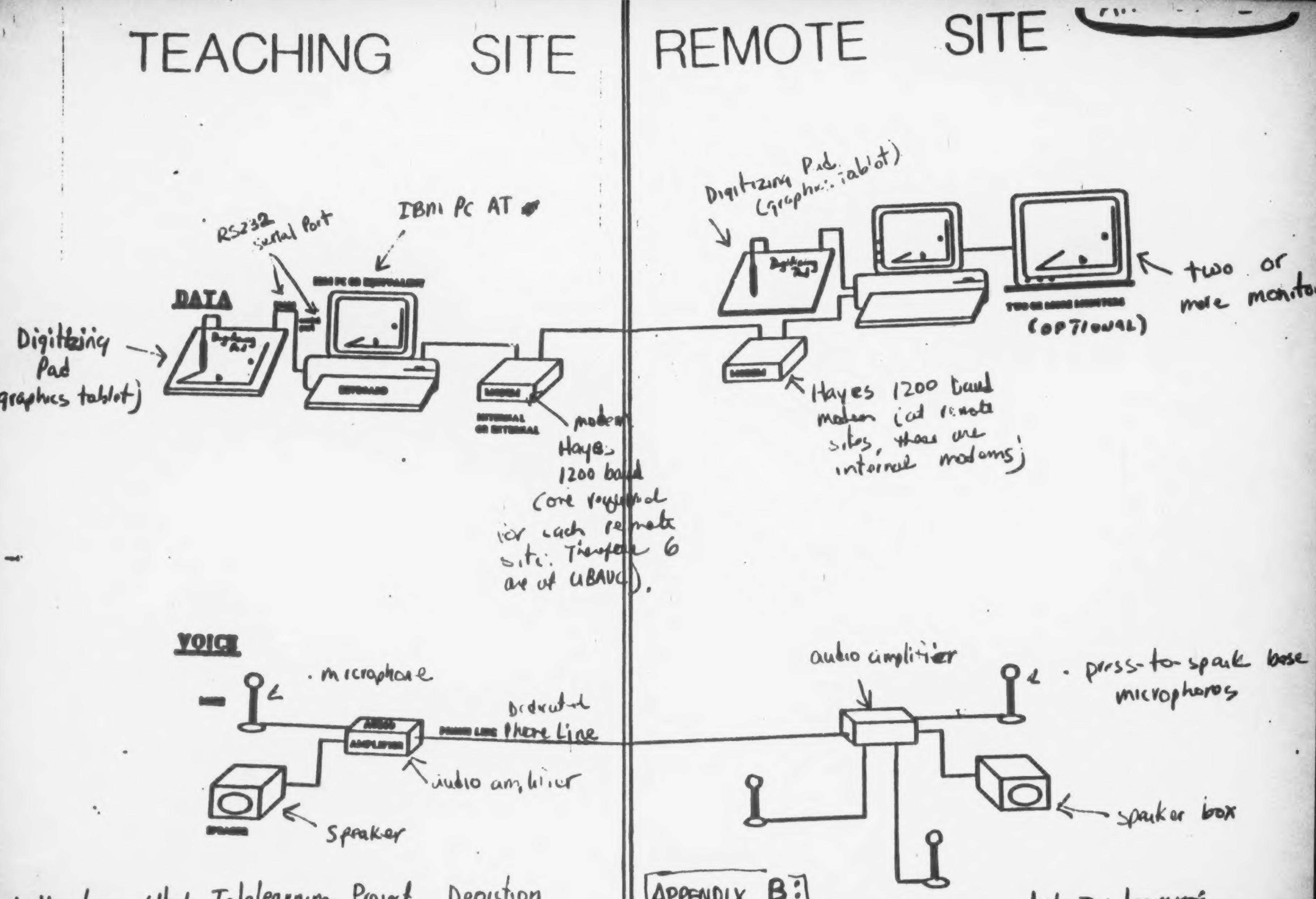
capabilities include audiographics and duplex TV over microwave. No telephone lines; data, voice, and video transmissions are via microwave A mutliplexer is used for voic and data transmissions when using audiographics ("muxed")

Union High school students (at Roosevelt) attend teleclasses live at the UBAVC.

These four sites are linked
with UBAVC by means of
1) two dedicated telephone lines for
audiographic communication just like
Rich High
simplex 1
audio +

APPENDIX A: A Depiction of the
technological capabilities between
to
n
rning

audiographic delivery from Roosevelt. Along with microcomputer audiographics, each of the other schools, Rich excepted, receives either simplex or duplex TV to enhance instruction. Rich High School, however, does receive videotapes (used for review) of all classes.


TEACHING SITE
REMOTE SITE
DATA
Digitizing Pad (graphics tablet)
RS232 serial Port
IBM PC AT
INTERNAL OR EXTERNAL
modem Hayes 1200 baud (one required for each remote site. Therefore 6 are at UBAVC).
Digitizing Pad (graphics tablet)
two or more monitors
(OPTIONAL)
Hayes 1200 baud modem (at remote sites, these are internal modems)
VOICE
microphone
Dedicated Phone Line
audio amplifier
Speaker
audio amplifier
press-to-speak base microphones
speaker box

Northeastern Utah Telelearning Project. Depiction
of audiographic equipment at UBAVC.

APPENDIX B:

Depiction of Northeastern Utah Telelearning
Project. Equipment for audiographics at each
remote site. Note: Between Manila and
Roosevelt, there are no dedicated telephone lines.
, data is via multiplexer (muxed) over

Appendix C

Estimate of Costs to Receive Tele-courses Via Audiographics From the Perspective of Northeastern Utah Telelearning Project Member Schools

Equipment and software:	6,600.00
Maintenance:	900.00-2,400.00
Operating costs:	30.00 per hour for the use of EDNET
Subscription fee:	10.00-26.00 per hour

Personnel: Tele-teacher for each course (teacher salaries are shared by recipients)

Facilitator for each classroom

Note: Due to the various technologies involved, some sites have higher expenses than others (e.g. Rich High School only receives audiographics instruction via telephone lines whereas Manila High School receives two-way TV instruction via microwave and uses codec and multiplexers).

Appendix D

Responses From Utah Questionnaires

Administrator Questionnaire
(6 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer fo: each of the following questions.

1. ESTIMATE the total enrollment of your school. Avg. = 237 students

2. ESTIMATE how many students in your school are enrolled in tele-courses. Avg. = 13 students

3. Describe the academic level of students participating in tele-courses.
   a) mostly "A" and "B" students = 4 students
   b) mostly "C" students = 0 students
   c) mostly "D" and "F" students = 0 students
   d) all types of students = 2 students

4. How would you describe the classroom manager/facilitator of tele-courses?
   a) certified teacher in subject area being taught = 1 facilitator
   b) certified teacher, but not in subject area being taught = 2 facilitators
   c) teacher aide = 3 facilitators
   d) volunteer = 0 facilitators
   e) other = 0 facilitators

5. ESTIMATE the number of hours you spent last semester observing the tele-course(s) in your school. Avg. = 15

Based on your experience with students being taught via satellite, answer the questions below, using the following five point scale:

	Strongly Disagree				Strongly Agree
	1	2	3	4	5
6. The quality of the tele-teaching in our school is as good as the quality of our regular teaching.	Avg. = 3.5				

7. Regular classroom teachers in our school feel their jobs are threatened by "distance education" instruction. Avg. = 2.17

8. The teacher union (or state teachers' organization) in our state is supportive of the use of tele-teaching in our school. Avg. = 3.33

9. Parents in our district are supportive of the use of tele-teaching in our school. Avg. = 4

10. Our school board is supportive of the use of tele-teaching in our school. Avg. = 4.67

Rate each of the following items on the basis of "Poor" to "Excellent":

Don't Know	Poor			Excellent	
0	1	2	3	4	5

11. Attitude of students toward tele-courses. Avg. = 3

12. Attitude of students toward tele-teachers. Avg. = 3.17

13. Quality of student learning achieved via tele-learning. Avg. = 3.4

14. Overall attitude of teachers in your school regarding quality of courses taught via tele-teaching. Avg. = 3.5

15. Use of audio-visual aids in tele-courses (e.g. pictures, overhead transparencies, films, videos, etc.). Avg. = 3

16. Frequency of actual teacher/student interaction in tele-courses (that is, tele-teacher actually addressing individual students and students verbally responding to tele-teacher). Avg. = 3.5

17. Benefit of tele-courses to your school's instructional program. Avg. = 4.17

18. Cost effectiveness of tele-courses -- that is, has the learning achieved by students been worth the money? Avg. = 3.17

19. Do you formally evaluate the tele-teachers in the same way you evaluate the regular teachers?
   a) yes = 0 formal evaluation
   b) no = 6 formal evaluation.

20. What are the two or three major benefit(s) of tele-courses for your school?

   1. Ability to expand curriculum. = 5 responses
   2. Ability to offer college prep and credit. = 2 responses
   3. Cost effective. = 1 response

20. What, if any, have been the major problems you've encountered?

   1. Scheduling conflicts. = 3 responses
   2. Students becoming bored with the classes. = 2 responses
   3. Limited help for students taking the courses. = 1 response

Tele-teacher Questionnaire
(5 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. How many years have you taught school? Avg. = 13 years

2. How many years have you been teaching TV courses? Avg. = 2.8 years

3. Do you teach any regular classes?
   a) yes = 5 responses
   b) no = 0 responses

4. What is your highest college degree?
   Bachelors = 1
   Masters = 3
   Doctorate = 1

5. Did you receive training for your TV teaching assignment?
   a) yes = 0 responses
   b) no = 5 responses

6. How many students are enrolled in your TV course(s)?
   Avg. = 19 students

7. How many sites are there in your TV course(s)? Avg. = 4 sites

8. ESTIMATE what you think is the ideal class size (all sites combined) for a distance education class. Avg. = 19 students

9. At what point do you think class size (all sites combined) becomes too large? Avg. = 34 students

10. ESTIMATE how long it takes, on the average, to prepare a daily lesson for your TV course. Avg. = 38 minutes

11. ESTIMATE how many days it takes for students in your TV course to have their homework assignments/tests graded and returned to them.
    Avg. = 5.4 days

12. For a typical tele-course, ESTIMATE the number of telephone calls you receive from parents of students during an average semester.
    Avg. = 1.8 calls

13. For a typical tele-course ESTIMATE the number of telephone calls you initiate to parents of students during an average semester.
Avg. = 1.6 calls

14. Is your tele-teaching formally evaluated by school principals (or othe administrators) at distant site locations?
a) yes = 3 responses
b) no = 2 responses

15. Is your TV course(s) mostly geared for
a) remedial students? = 0 students
b) average students? = 0 students
c) advanced students? = 3 students
d) mixture of all of these = 2 students

16. Do you receive a higher salary for teaching TV courses than you would if you taught in a regular classroom?
a) yes = 1 response
b) no = 4 responses

17. Do you have a reduced teaching load, as compared to a regular teacher, because you are a TV teacher?
a) yes = 0 responses
b) no = 4 responses

18. What are the THREE most important ways that tele-teaching is different from regular classroom teaching?

1. It is difficult to have one-on-one communication. = 3 responses
2. It requires good teachers. = 2 responses
3. It is more time consuming. = 2 responses

Answer the questions below, based on the following five point scale:

Strongly Disagree — Strongl Agree
1 2 3 4 5

19. Tele-teaching technologies will replace regular classroom teachers. Avg. = 1.6

20. Preparing lesson materials for delivery via tele-teaching technologies is much more time consuming than preparing lessons for regular teaching. Avg. = 3.6

21. Students in my tele-course(s) are assigned as much homework as students in regular classes. Avg. = 4.6

22. Student cheating on tests or assignments occurs very infrequently in my tele-course(s). Avg. = 3.8

Regular Teacher Questionnaire
(15 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer fo each of the following questions.

1. Are you aware that "distance education" courses are being taught in your school?
   a) yes = 15 responses
   b) no = 0 responses

2. Have you ever observed the distance education class(s)?
   a) yes = 12 responses
   b) no = 3 responses

   If yes, how would you rate the quality of instruction provided students (on a 5 point scale where "1" is "poor" and "5" is "excellent")? Avg. = 3.9

3. Have you taken any inservice training courses at your school that have been presented in a "distance education" delivery mode?
   a) yes = 1 response
   b) no = 4 responses

   If yes, a) ESTIMATE the number of courses. Avg. = 2 courses

   b) Rate the quality of training presented (on a 5 point scale where "1" is "poor" and "5" is "excellent") Avg. = 4

   c) Did you interact with the tele-teacher during a course?
      a) yes = 1 response
      b) no = 0 responses

   d) Did you interact with other teachers at your site during a course?
      a) yes = 1 response
      b) no = 0 responses

   e) Did you interact with other teachers at other sites during a course?
      a) yes = 1 response
      b) no = 0 responses

4. Which type of inservice classes do you prefer?
   a) traditional inservice with an on-site trainer/instructor = 5
   b) training delivered via one-way TV. = 1

Based on your knowledge of tele-courses offered to students at your school, answer the questions below, using the following five point scale:

Don't Know	Strongly Disagree				Strongly Agree
0	1	2	3	4	5

5. Tele-courses appear to be more difficult than traditional courses. Avg. = 3.08

6. Students would do better in a traditional setting. Avg. = 2.55

7. Students would rather take a tele-course than a course in a traditional setting. Avg. = 2.69

8. The tele-teacher seems to be personable with students (seems to convey a feeling of caring about students). Avg. = 3.39

9. The tele-courses will help students at our school get into college. Avg. = 4.33

10. Students typically have to work harder during a tele-course than in regular classes. Avg. = 3

11. Only certain students at this school are allowed to take a tele-course. Avg. = 2.08

12. Offering courses via tele-teaching will significantly reduce job opportunities for regular classroom teachers. Avg. = 2.27

13. Would you like to teach a tele-course?
    a) yes = 5 response
    b) no = 8 responses

14. What are the two or three major strong points of the TV teaching in your school?

    1. Ability to expand the curriculum. = 14 responses
    2. Advanced training for college bound students. = 4 responses
    3. Being exposed to good teachers. = 3 responses

15. What are the two or three major weak points of the satellite teaching in your school?

    1. Scheduling conflicts. = 5 responses
    2. Very little teacher-student interaction. = 4 responses
    3. Difficulty in finding facilitators. = 4 responses

16. ESTIMATE the number of times you have observed instruction on the tele-system in your school. Avg. = 7 times

Facilitator Questionnaire
(8 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. Are you certified to teach in the subject being offered?
   a) yes = 0 responses
   b) no = 8 responses

2. How many tele-courses do you oversee? Avg. = 3

3. Are tele-courses at your school mostly geared for
   a) remedial students? = 0 students
   b) average students? = 6 students
   c) advanced students? = 5 students
   d) other? = 1 behaviorally disturbed student

4. Is the tele-system used for teacher in-service training?
   a) yes = 5 responses
   b) no = 3 responses

5. ESTIMATE the total number of hours you spent training for your tasks in the tele-classroom. Avg. = 9 hours

6. ESTIMATE the total number of times students in an average satellite class talk to the tele-teacher each week. Avg. = 17.5 times

7. ESTIMATE the average number of students in a tele-class at your site. Avg. = 7 students

8. ESTIMATE the average number of students in an entire tele-class (including all sites). Avg. = 16 students

Answer the questions below, based on the following five point scale:

	Strongly Disagree				Strongly Agree
	1	2	3	4	5
9. Tele-courses appear to be more difficult than traditional courses.	Avg. = 2.63				

10. Students would do better in a traditional setting. Avg. = 2.88

11. Students would rather take a tele-course than a regular course. Avg. = 3.13

12. The tele-teacher seems as knowledgeable as the regular teachers in this school. Avg. = 4.75

13. I can easily contact the tele-teacher if I need to. Avg. = 4.57

14. The tele-course will help students get into college. Avg. = 4

15. Students have to work harder during a tele-course. Avg. = 3.29

16. Only certain students at this school are allowed to take a tele-course. Avg. = 3.71

17. Homework assignments are returned to the tele-students more slowly than to the regular students. Avg. = 3.71

18. The tele-teacher can recognize the students' voices and call them by name. Avg. = 4.14

19. The tele-teacher asks more questions than a regular teacher would. Avg. = 3

20. Student cheating on tests or assignments occurs very infrequently in this tele-course. Avg. = 3.43

21. What are the system's strong points?

    1. Ability to expand the curriculum. = 4 responses
    2. Ability to offer college prep and credit. = 2 responses
    3. Students gain better communication skills. = 1 response

22. What are the system's weak points?

    1. Discipline can be a problem. = 4 responses
    2. No real teacher-student relationship. = 2 responses
    3. Scheduling conflicts. = 1 response

Student Questionnaire
(64 returned)

Distance Education Study
United States Congress

The United States Congress, through the Office of Technology Assessment, has authorized a study of selected distance education programs in the United States. Please WRITE in or CIRCLE the appropriate answer for each of the following questions.

1. What year are you in school?
   a) 9th grade = 12 students
   b) 10th grade = 12 students
   c) 11th grade = 11 students
   d) 12th grade = 28 students
   e) other (explain) = 1 college freshman

2. ESTIMATE your grade point average for the past three years.
   a) "A" student = 17 students
   b) "B" student = 31 students
   c) "C" student = 10 students
   d) "D" student = 6 students

3. If you had a choice between enrolling in a tele-course or taking the same course in a regular classroom, which would you choose?
   a) regular class = 35 responses
   b) tele-class = 29 responses

4. Are you taking this course for Advanced Placement?
   a) yes = 10 responses
   b) no = 54 responses

5. How many tele-courses are you enrolled in? Avg. = 1.2 courses

Answer questions 6, 7, 8, 9 and 10 for your most enjoyable TV course. (If you are enrolled in only one course, then answer for that course.)

6. ESTIMATE the number of times during the last week that you contacted your "tele-teacher". Avg. = 11.7 times

7. ESTIMATE the number of times during the last week that your "tele-teacher" contacted you. Avg. = 6.4 times

8. Is this class an elective or is it required?
   a) elective = 29 responses
   b) required = 35 responses

9. How many students are in the class at your site? Avg. = 7 students

10. ESTIMATE the number of students in the entire class (including all sites). Avg. = 18 students

Answer the questions below, based on the following five point scale:

Don't Know	Strongly Disagree				Strongl Agree
0	1	2	3	4	5

11. Tele-courses are more difficult than regular classes taught in school. Avg. = 3.06

12. I could make a better grade if the course was taught in a regular setting. Avg. = 2.93

13. I've gotten to know the students in my tele-course as well as the students in my regular classes, even though my tele-classmates are farther away. Avg. = 1.8

14. I work more closely with the students in my on site tele-class than with students in my regular classes. Avg. = 2.74

15. My tele-teacher is as friendly to me as most regular teachers in my school. Avg. = 3.89

16. I can easily contact the tele-teacher to ask questions or make comments if I want to. Avg. = 3.81

17. The tele-course(s) I am taking will help me get into college. Avg. = 3.38

18. I have to work harder in my tele-course than I do during a regular class. Avg. = 3.44

19. Only certain students at my school get to take a tele-course. Avg. = 2.12

20. Homework assignments are returned more slowly in tele-courses than they are in most of my regular classes. Avg. = 3.63

21. The tele-teacher knows all of the students at my site by name. Avg. = 4.12

The tele-teacher asks more questions during class than most regular teachers do. Avg. = 3.18

What are the three best things about a tele-course?

1. Ability to expand the curriculum. = 22 responses
2. Ability to interact with students at other schools. = 19 responses
3. Ability to receive college prep and credit. = 13 responses

24. What are the three worst things about a tele-course?

1. Not much personal attention. = 19 responses
2. Slow homework return. = 11 responses
3. Minor technical difficulties. = 10 responses

Appendix E

22.

23.

Information contained in this case study was obtained via printed materials supplied by administrators from the Northeastern Utah Telelearning Project, Utah State Office of Education, and KUED-Channel 7 at the University of Utah; from survey data mailed to each of the participating schools and returned from them in February and March 1989; and from on-site interviews and class observations with the following individuals on the dates listed below:

February 22, 1989

Dale Steadman
Technology Specialist
Division of Research and Development
Utah State Office of Education
Salt Lake City, Utah

Doug Jones
Director of Learning Services
KUED-Channel 7
University of Utah
Salt Lake City, Utah

George Miller
Project Coordinator
Northeastern Utah Telelearning Project
Uintah Basin Area Vocational Center
Roosevelt, Utah

February 23, 1989

Russell Peterson
Studio Manager
Northeastern Utah Telelearning Project
Unitah Basin Area Vocational Center
Roosevelt, Utah

Bruce Hardinger
TV Camera Operator
Northeastern Utah Telelearning Project
Unitah Basin Area Vocational Center
Roosevelt, Utah

David Hunt
USU Math Instructor
Northeastern Utah Telelearning Project
Unitah Basin Area Vocational Center
Roosevelt, Utah

Bart Willis
German Language Instructor
Northeastern Utah Telelearning Project
Unitah Basin Area Vocational Center
Roosevelt, Utah

Jack Bell
Principal
Altamont High School
Altamont, Utah

Diane Gile
School Media Director &
Telelearning Classroom Facilitator
Altamont High School
Altamont, Utah

Selected Telelearning Students
Altamont High School
Altamont, Utah

Jane Thompson
Principal
Thompson Alternative School
Roosevelt, Utah

Revamp
June

SUMMARY AND IMPLICATIONS

Interest in telecommunicated distance education has grown so rapidly in the past five years that it is virtually impossible to accurately document the many projects presently underway in the United States or being considered. Partly as a result of Federal Star Schools funding, and certainly as a result of the growing interest in distance education, the growth of satellite TV networks for K-12 instruction has been phenomenal. In fact, interactive satellite broadcasts for K-12 instruction are now received by over 1000 schools in more than 40 states. This is somewhat breathtaking when one considers that interactive satellite TV broadcasts for K-12 instruction first began in 1985.

Yet the current interest in distance learning is not confined to satellite technology alone. Successful interactive TV projects delivered via microwave, fiber optics, or cable are operating between cooperating high schools in a multitude of states. And, microcomputer based teleteaching which links personal computers and speaker telephones over regular telephone lines are being used in Utah, Pennsylvania, New York, Alaska, Nevada, North Dakota, South Dakota, Louisiana, and Texas to name just a few states.

Completion of this distance learning case studies contract for the Office of Technology Assessment has provided an opportunity for the researchers (Barker and Patrick) to travel broadly across the country to observe various distance education programs and technologies in practice at the K-12 level. The experience has been rich in terms of seeing students -- mostly rural -- learn new subjects and content that otherwise would not be available to them.

Compilation and analysis of the data collected, and observations of each of the projects reported has confirmed that there is *no one best* method or technology that should be used. If there is an "ideal" method to deliver instruction, it has been and will continue to be the traditional model -- a well trained and well prepared teacher in the classroom who is certified in the subject area being taught. But, because of low student enrollments in various courses or teacher shortages in certain areas, the "ideal" situation is not always possible. Then, the next best approach is to search for technology based distance education alternatives. Under the right conditions, each technology investigated in the case studies reported herein -- satellite TV, fiber optic TV, microwave TV, cable TV, or audiographic microcomputer teleteaching -- as well as other technologies, can reach and greatly benefit students.

The selection of the media utilized is important insofar as the goals, needs, and financial resources of the local school are concerned. If a district has need just for a Spanish course, it doesn't seem practical to invest in a large satellite dish and TV receive equipment, join a national network, and pay the annual subscription fee for just one course. It may well be more practical and cost-effective to link with a neighboring district and "electronically" share their Spanish teacher via a two-school partnership by means of an audiographic network. Small partnerships have the benefit of maintaining local control of the distance education teacher, curriculum content, scheduling of classes, and size of the class in terms of student enrollment. Successful partnerships observed ranged in size from two to four districts (schools) connected by means of either audio and/or video linkages. These included two-way TV systems, and two-way microcomputer systems.

If the desire is to provide programming simultaneously to a much larger area, then microwave or satellite technologies seem much more practical. Microwave technologies lend themselves more to a regional or area wide application while satellite is best for either statewide or national coverage. Although the costs to establish either microwave or satellite networks is much higher than audiographics systems, distribution of costs among a large number of users can still make such systems cost-effective.

Much has happened and is continuing to happen in the field of distance education. As the technologies become more accepted by local and state educational leaders, we must also recognize that distance education technologies are not an educational panacea. There are definite advantages and there are disadvantages to each technology as well as differences between vendors of respective technologies. Some of the advantages and disadvantages of three of the more popular technologies -- satellite delivery, audiographics delivery, and two-way full-motion TV delivery are listed below. The lists are presented to provoke thought and are by no means exhaustive.

Advantages of satellite TV teaching

1. Students can see the teacher.
2. Full-motion video is possible.
3. Teacher/student audio interaction is possible.
4. Real-time print distribution of handout material is possible with most systems.
5. Satellite technology can be merged with other media (eg. fax, videotapes, etc.)
6. Satellite signals are distance insensitive -- large geographical areas and many remote sites can be covered simultaneously helping to reduce costs by sharing them among a large number of users.

7. Most satellite systems are a "turn-key" operation. Programming, instruction, grading of students, distribution of materials, etc. are provided by the satellite vendor.

Disadvantages of satellite TV teaching

1. Program offerings are centralized limiting local control by local districts. This may result in loss of local control of teaching and interpretation of the curriculum by local education units

2. The TV teacher cannot see the students.

3. An audio "echo" is often inherent in student talk-back through the TV system when telephoning to interact with the TV teacher.

4. Some receive dishes (Ku band) are weather sensitive -- during heavy rains or snows, the signal can be lost.

5. The potential exists for large class size.

6. There is very limited student-to-student interaction at different sites. The technology seems to chiefly promote teacher-student interaction and not student-to-student interaction.

7. Large satellite systems that broadcast throughout the United States can promote the creation of a "national curriculum"

8. Bell scheduling conflicts, time zone differences, differences in dates for scheduling spring breaks, holidays, etc. often conflict with local school schedules and are not easily resolved.

Strengths of audiographic teleteaching (microcomputer networking)

1. Low cost is terms of hardware, software, and maintenance.

2. Relatively simple to learn and to operate.

3. Perpetuates rural school traditions of (a) small class size, and (b) local control of the teacher and the curriculum.

4. Permits not only teacher-student interaction but also allows for student-to-student audio interaction as well as computer graphic interaction.

5. Any participating site can serve in either a "receive" or a "transmit" mode.

6. Presentation of instruction emphasizes content and organization of material rather than the personality of the teacher, because students to not see the teacher.

7. Students at all sites and the teacher share the same visual reference on the computer screen

8. Operates over regular dial-up telephone lines making it possible for virtually any school in the United States to link up with another school if both are supplied with necessary equipment and software.

Weaknesses of audiographic teleteaching (microcomputer networking)

1. Motion of video images is not possible.

2. The instructor cannot see the students, nor can students see the instructor or other students at distance sites.

3. Extraneous "noise" or interference on the telephone lines can cause voice transmission on the speaker telephones to occasionally "break up."

4. Transmission costs for telephone toll charges can become excessive.

5. The video graphics/image displayed between computer monitors is limited to the size of the computer screen unless additional hardware costs are incurred.

6. Lesson planning (creation of computer visuals) can be considerably time consuming for the teacher, and floppy disks must be distributed to all remote sites prior to instruction.

7. Requires a commitment by school administrators in terms of human resource time to recruit teleteachers and classroom facilitators, train teachers and facilitators, manage the system, etc.

Advantages of Two-way TV instruction (fiber optics, some microwave systems, cable, etc.)

1. Two-way, full-motion video is possible between all sites; students can see the teacher as well as other students at different sites, and the teacher can see all students at all sites.
2. Most systems presently in operation are small networks that promote local control of the teacher and curriculum and maintain an overall small class size.
3. Open-line microphones allow for full teacher-student and student-to-student audio interaction. That is students can interact audibly not only with the TV teacher but also with students at other sites.
4. Most TV signals are usually unaffected by weather.

Disadvantages of Two-way TV instruction (fiber optics, microwave, cable, etc)

1. Cable (to be used as an extra broadcast channel) in many rural areas is still not available.
2. Fiber optics, although becoming more available, is still not accessible in many rural communities; also it is very expensive to lay if it has not already been installed.
3. Virtually all successful two-way TV systems are based around a partnership arrangement between the local school and business or industry officials in the area; some rural communities may not have the "required" pool of human resources available.
4. Most systems require a large amount of capital investment to get started.

Even though there are some disadvantages associated with each technology, the advantages seem to far out weigh the disadvantages. Also, some of the stated disadvantages may in the future be eliminated as professionals in the field find solutions around some of the concerns identified.

Selected Distance Education Issues

Successful use of distance education technologies demands that certain issues be addressed. Those listed below seem to be common among most projects. The manner in which each is addressed, however, often varies between vendors and/or systems used.

Materials transfer

Each distance education project must establish an efficient and reliable system to exchange materials between participating schools. Tests, quizzes, assignments, textbooks, and other materials may be transported by postal service, teachers who live in one district but teach in another, fax machines, etc.

Classroom management

A single policy for dealing with students in distance education courses should be established and enforced. A consistent procedure for dealing with student discipline problems is vital to the success of a distance education program.

Remote site visits by teachers

Students at remote classrooms should have the opportunity to periodically meet their teacher "in the flesh" and become personally acquainted. The same is true for getting acquainted with other students at different sites.

Levels of interaction

Are students able to interact only with their distance education teacher or can they also interact freely during the class with other students at remote sites? Technologies that permit interaction only between teacher/student are much more limiting instructionally than those that permit both teacher/student and student/student interaction.

Extent of course offerings

Programs that offer a variety of courses or a broad curriculum are generally more favorably received than those that offer only a few courses.

Selection of teachers for distance education delivery

Distance education teachers of necessity must be "master" teachers. This implies not only that they understand and model principles from the literature on "effective teaching," but that they also know how to best use the respective telecommunications medium to convey their teaching. For example, we can learn much from the field of mass communications (eg. commercial radio and television) in regards to how to present information via the airwaves. Furthermore, teaching pedagogy -- as related to distance education -- requires forced interaction between teacher and students, a slower pace of instruction, clear logical presentations with sufficient structure, etc.

Technical breakdown

There will be "down time" with any system. Anyone who drives a car knows that technology doesn't always work. Who's going to fix things when they break down. Maintenance agreements with vendors and contractors are important factors for policy makers to consider when forming a cooperative or entering into an agreement with a large distance education vendor.

Teacher training

Some training of teachers is essential. Regardless of how exotic or exciting the technology may be, it will never be a substitute for poor instruction. Ultimately, the significance of the content presented and the quality of the presentation delivery will be much more important than the technology used to convey the message. Effective training of teachers and classroom facilitators is vital for program success.

The "personal touch"

There must be a personal touch between both the students and the teacher regardless of the distances involved. The students at the remote sites must feel a sense of belonging to the host site classroom. The teacher should call the students by name, look directly into the camera (if the instruction involves TV delivery) as though he/she is looking at them. The telephone adage to "reach out and touch someone" definitely has meaning when delivering distance education course work.

Scheduling

One of the biggest problems with large distance education programs is the matter of bell scheduling. This becomes compounded when programs are broadcast over different time zones. The matter is not easily resolved because a school district's bell schedule is dependent upon bus routes, lunch schedules, elementary and middle school schedules, etc. A related problem is the scheduling of local school start and ending dates, parent teacher conferences, state mandated teacher inservice or preparation days that close classes, variation in Spring breaks and Christmas vacations, etc. Another concern is the issuance of grades. Some schools operate on a 9 week grading period while others are on 6, 12, and 18 week student evaluation periods. The need to satisfy the requests of individual schools cannot be taken too lightly.

Local control

Many rural school districts fiercely protect local control of their curricula and scheduling. Most often, they do not want outside "experts" dictating what classes will be taught and when. Local educators should have a choice of options when selecting a distance education alternative. For example, if a school selects one of the present satellite vendors, a steerable dish with a Ku and C band feedhorn should be the standard downlink dish. This would allow the school an opportunity to take classes from a selection of vendors and not be "locked in" to just one provider. The school, thereby, has control in terms of selecting programs and offerings, and to some extent scheduling.

Class size

Overall class size will have a direct impact on opportunities for student interaction. Small, locally controlled cooperatives usually limit class size and thereby enhance opportunities for interaction between the teacher and students. Systems that have a national focus (eg. satellite vendors) may have 200+ students enrolled resulting in with very limited opportunities for interaction. In such cases, the program provider should have in place a student support system which assures that individual students do not "get lost in the cracks" when they call in for help or need assistance.

Successful distance education practices

Without question, programs using distance education delivery techniques seem to be working. Naturally, some programs are more successful than others. Characteristics which seem to be common among successful programs include, but are not limited to the following:

1. The program/system must be carefully planned, well organized and efficiently managed.
2. A multi-media approach is typically more effective than a single type delivery system (eg. fax, computers, and TV)
3. Distance education is **not** curriculum specific.
4. Successful programs are based on current educational theory and practice. Correct principles of instructional design are vital for program success. Teacher presentation techniques should be in harmony with the current literature on effective teaching.
5. The master teacher is the crucial element of success. Must be a subject matter specialist, highly motivated, enthusiastic, charismatic, and able to project well over the selected medium.
6. The classroom facilitator at the remote site must like young people and be a strong supporter of distant education. The facilitator is the "eyes and ears" of the master teacher and has a key role in making the program a success.
7. Educational support systems must allow for the smooth and efficient exchange of written materials (homework, tests, etc.) between the originating site and the remote site locations.
8. Finally, the success of any telecommunicated distance education delivery system will ultimately depend more on the quality and usefulness of the content received than upon the equipment used.

Identifying a Research Agenda

It is expected that the current interest in distance education will continue to grow and that existing networks will expand and new projects will be established. As they do, administrators of distance learning programs and program vendors can anticipate close scrutiny from educational researchers, policy makers, and funding agencies. Distance learning has entered the education scene so rapidly that few questions relative to program quality or student performance have been asked. That position is changing, and rightly so. Ongoing evaluation is needed to truly assess the value and contribution that telecommunications technologies bring to education. An important challenge faces educational researchers to formulate a research agenda that addresses and begins to evaluate this exciting new field.

Selecting a System

Obviously there are a number of issues that can arise when deciding which distance education technology to use. Different school systems may have contrasting goals and requirements. Some school systems may value convenience, others may value the maximum amount of control. In the final analysis, the key to the future is more than just selecting the right technology -- it is the partnership arrangement that exists in the locality.

Technologies such as fiber optics, satellite, and microwave will come and go. No doubt they will be eclipsed by other technologies in the future. What is important is the having the organizational structure and the partnership in place, and having the combined vision to pick and choose from existing technologies. That is what will drive the future -- having people who are willing to talk and work together in choosing a system that best fits the need.